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EDITORIALS

The Adolescent and Young Adult with Cerebral Palsy

IT is a commonplace to say that the present is a time of change. Not only are technical developments altering the world we live in almost to a bewildering degree, but the attitudes of mind which have persisted in an apparently unshakable manner for centuries are melting like snow in the spring sunshine. Old fears and old taboos are losing their dark clouds of obscurity. Revealed in the sunlight we wonder how it was ever possible for them to be so terrifying and unacceptable. The articles in this issue by R. C. MAC KEITH and M. BAX and by Miss M. R. MORGAN should be a source of encouragement and hope to the parents and relatives of many who are afflicted with handicaps not only of the body but of the mind. Not so long ago it would have been impossible to write so confidently and hopefully.

Cerebral palsy in the past was a burden, for many, almost too great to endure, but now, with modern methods and the support of the community, even severe cases can be offered hope and the possibility of productive creative activity. This is Mental Health Year, and it is well to remember that nearly 70 per cent of those afflicted with cerebral palsy also have some degree of mental handicap as well. The best time to start treatment is as early as possible after the disability is diagnosed.

The basic need for all human beings is for acceptance, encouragement and status—they need to feel that they are valuable and valued, and that they have the affection and love of their fellows. Without this support, potential can seldom be realised. Individuals working alone, parents in particular, can do something to help, but, if some small measure of independence is to be achieved, community support, teamwork, is essential. MAC KEITH and BAX and Miss MORGAN not only point the way to future needs for development but help to clarify the present situation.

Cerebral palsy is a tragic and often insuperable bar to participation in normal life. It is essential for parents to be realistic without being defeatist and to have available an experienced team of specialists who can advise on what is feasible and show how best to make use of limited endowments, mental and physical. The place of the counsellor and the well-trained social worker are rightly stressed. They are primary supporters and guides for the parents and links with the community. Given the necessary training for all members of the team and the availability of training facilities for the handicapped individual, the motto might well be adopted: *Solvitur ambulando.*

One must be realistic, but the impossible is sometimes achieved by those who do not know when they are beaten,

who persist in the face of insuperable odds. The relative defeat of one may represent a glorious achievement for another.

Certainly, as the articles stress, assessment is an evolutionary process, progressing with training and closely linked with morale. It must start early, and, while general education must not be neglected, it may be necessary to modify the curriculum to suit individual needs. It is surely unrealistic to insist on general treatment to a point where specific needs are neglected.

Since teamwork—the basis for successful direction of development, home, school, social adjustment and occupation—is of fundamental importance, it is essential that information should be adequately recorded and transmitted, so that each member of the team is properly briefed at each stage. Co-ordination must be improved. All too often, at present, opportunities have been lost: individuals have failed because they were not properly trained, or not placed in suitable employment, or inadequately supported in employment.

An important point, and unfortunately one often overlooked, is the late development of many spastics. Chronologically they have reached the school leaving age but biologically they are still very immature and may continue to develop for several years. The short assessment at rehabilitation units is often far too brief and superficial to do justice to many of these late developers. Emotional equilibrium and a sense of security and participation, acceptance are essential for optimal physical performances. Emotional maladjustment is a common cause of failure in physical activity. What the individual would like to do must always be given sympathetic consideration, because if the will is there and patient encouragement is given the apparently impossible may be achieved. Twenty years ago, how many would have thought the present levels of achievement possible?

The idea of an educational centre to bridge the gap between adolescence and adulthood and avoid precipitate decision is surely good. The Youth Employment Officer must not only be well trained technically but must possess a particularly sympathetic and patient temperament. Placing is only the initial step. It must be associated with preparation and education of those with whom the young person will work and a close follow-up over a period of years. Opportunities for training and sheltered workshops are still quite inadequate, though the excellent work done by pioneer centres provides the experience on which to base necessary development. The aim is not rehabilitation but development of potential. The aim must always be positive rather than diversionary. MAC KEITH rightly lays stress on the fundamental importance of assessment in spite of the great complexity of the problem. The problem of multiple handicaps is particularly hard, and it would be too much to expect rapid development in this field, but given training, insight on the part of parents, public and employers, and a suitable breakdown of jobs to provide simple repetitive work, a great deal more can and should be done. Wages may be small, but as a symbol of achievement and social status they can mean a great deal to the individual.

Many parents are willing to bear their heavy responsibilities for their severely handicapped children, but in addition to opportunities for training and occupation handicapped young people need to relax from time to time. There is a need for more holiday homes and emergency centres, where, without any sense of hospitalisation, handicapped youngsters can find easy access when their parents and other relatives need a rest or some emergency arises. More day centres would enable more of these young people to be kept at home. Larger allowances might be made to those in charge of centres to provide greater amenities for the relief of all concerned. The need is underlined by the existence of long waiting-lists for residential centres and the lack of suitable transport in many areas, so that full advantage cannot be taken of day centres.

The new factory with an accompanying hostel being sponsored by the National Spastics Society is an encouraging development, and Local Authorities are also making progress, including the Buckinghamshire County Council scheme at Slough. Much remains to be done.

Teachers and doctors have an important part to play. In particular, there is need for better understanding of the problems and closer co-ordination between general practitioners, the School Health Service and doctors working in industry. The special opportunities offered by the statutory duties of the Appointed Factory Doctor are at present largely neglected. Better use of these facilities could do much to ensure a smooth follow-through from school to work and adequate support during the early years at work.

The battle, as has so often been said, will be won in the minds of men. Where there is a will there is a way.

M. E. M. HERFORD

A Dermal Sense of Space

THE experiments described by RENFREW and MELVILLE[1] in their paper in *Brain* last year are an attempt to establish the existence of a dermal space sense, to measure its threshold, and to determine its importance. The authors begin their paper with an argument in favour of the separate existence of such a dermal sense, discussing its relationship or not to two-point discrimination, and going on to sermonize further (with much pulpit thumping) on analogies in the visual sphere. Dermal space is considered in terms of two planes, 'surface space' being parallel to the skin surface and 'depth space' perpendicular to it. A number of test objects were devised to test the two components. For surface space there were:

1. A two-point discriminator.
2. A direction object consisting of knife-edged blades of adjustable lengths (up to 12 mm.). The subject had to identify the direction of a blade, placed either across or in the long axis of his hand.
3. A size object, the same as the preceding object. The subject had to distinguish the smallest blade from control objects.
4. Shape objects, consisting of three points, the middle one of which could be moved out of line by a measured distance. The control object consisted of three points in a straight line.
5. Hinge-object, which was a simple hinge. It was applied to the palm with the ends of the blades separated by a measured distance and this had to be distinguished from a simple blade.
6. Curved object, which was a celluloid strip bent into an arc and mounted on a scale. It had to be distinguished from a straight strip.

The test objects for depth space were:

1. Micrometer-peg object. This consisted of three brass pegs with rounded tips 1 mm. in diameter, the middle one being attached to a micrometer to enable it to have a variable and measurable height. The control object was three similar pegs of equal length in a straight line.
2. Curved blade objects. These were pieces of acrylic with a convex end of known radius.
3. Micrometer blade objects. A micrometer was attached to two acrylic blades, so as to form a step of known size.
4. Cylinder-peg object. This was a hollow brass cylinder about 2.5 cm. in diameter; concentric with it, and attached to a micrometer, was a brass peg which could be protruded by a measured distance.

[1] Renfrew, S. and Melville, I. D. 'The somatic sense of space (choraesthesia) and its threshold. *Brain*, 1960, 83, 93-112.

5. Blade-step objects. These were squares of acrylic with steps of measured depth. The control was a flat square of acrylic.
6. Blade-peg objects. These were acrylic squares milled so as to leave small pegs (of various lengths) projecting from their surface. The control was again flat squares of acrylic.
7. Concave-blade objects, cut out of pasteboard and made to fit the contours of the subject's finger-tip.

Other test objects were used to measure sharp-blunt discrimination, touch and 'muscle-joint sense'.

By using these test objects, it was shown that there is only one threshold at any one site, which is common for two-point, shape, direction and size discrimination. This was constant at each site in an individual, and seemed to have about the same value in the finger-tips in all subjects. So far as the palm and dorsum of the hand was concerned, there was much more individual variation of threshold between subjects.

As regards depth space, the authors were unable to separate touch discrimination and space perception; there was, however, no correlation between surface space threshold and touch threshold. Joint sense threshold was found to be considerably greater than dermal space sense threshold in the finger-tip. The concave cardboard object showed that it was possible to identify the spatial aspects by touch-sense on the tip of the finger, and the authors suggest that there is 'an image of space which probably introduces tactile illusions into depth tests'.

The gradient of space threshold between the finger-tip and the palm is not paralleled by the touch feeling threshold, which is similar in both these sites.

Previous authors have drawn attention to the relationship of touch, two-point discrimination and joint position sense in various lesions of the nervous system. The present authors believe that the crudeness of tests of joint sense accounts for some of the apparent correlations.

Space feeling may be reduced while surface touch feeling is undisturbed, though space feeling is always reduced when touch feeling is reduced.

Evidence has accumulated that lesions of the posterior columns and of the parietal lobes result in a loss of discrimination of both dermal space sense and joint position sense.

RENFREW and MELVILLE postulate that the posterior columns carry space feeling and are the afferent limits of a system whose effector pathway is the pyramidal tract, with its function of space acting. The term choraesthesia is proposed as the somatic sense of space, dyschoraesthesia and achoraesthesia being the sensory counterparts of paresis and apraxia.

The annotators, who have reviewed this article by invitation, are convinced by the work of SHERRINGTON and his pupils that analysis of the stimulus is the sure clue to the physiology of sensation and to motor mechanisms. RENFREW and MELVILLE have extensively analysed one aspect of the stimuli provided by their test objects, and that is a three-dimensional spatial one. However, all stimuli have more than one parameter, shape and (equally

important) intensity and duration; the last two aspects appear to have been ignored by these authors. We believe that their results can be equally well explained in terms of the difference in the *intensity* of stimulation, for example, between the depth object and its reference points, and that the postulation of a separate sense of space is redundant.

ELIZABETH and
GEOFFREY RUSHWORTH

NOTICE

Scandinavian Journal of Psychology*

THIS new quarterly makes an excellent impression. Editors, publishers and printers have done a great deal to help the contributor communicate to the reader what he has discovered. Layout of text, tables and figures, division of the papers into sections, headings and sub-headings, and different sizes of print, have all been used with skill, not only to give the pages a most pleasing appearance, but also to help the reader find his way about and work quickly. The synopsis of about 100 words at the head of each paper is a good feature. The synopses of all the papers composing the number are reprinted on a loose sheet, which can be cut up and filed. The first page of each paper contains all the information needed when the paper is circulated as a separate. The Editors have been remarkably successful in getting the contributors to write lucidly, correctly and elegantly, and with economy of words, and in English too. If anyone doubts the importance of a strong editorial policy, let him look at this journal and see what it can do.

The publication of the new journal vouches for the confidence of the psychological associations of the four Scandinavian countries in their growing strength. All the papers in the first three numbers reach a high standard—although none is exciting, they all deserve publication in a journal with an international circulation. Psychophysics is well represented, and the work described in about half the papers could be so classified. The hundredth anniversary of the publication of Fechner's *Elemente der Psychophysik* is recorded in a brief editorial, and Stevens of Harvard has contributed by invitation a paper on the 'new psychophysics'. About a quarter of the papers deal with complex psychological functions, such as perception and problem-solving, and a quarter have reference to clinical or educational problems, including a paper by Husén on the abilities of twins, and one by Smedslund on a problem arising out of Piaget's work.

D. Russell Davis

* *The Scandinavian Journal of Psychology*, Vol. 1, 1960. Almqvist and Wiksell, 26 Gamla Brogatan, Stockholm, Sweden. Sw.kr.40 per year.

Anoxic Softening of the Brain

THERE is no more confusing region of descriptive morbid anatomy than neonatal neuropathology. This is largely because there seem to be so many different disease states without recognisable underlying mechanisms. Fortunately we are entering on a period of synthesis, following a slowly evolving and sometimes bewildering period of description. One of the main stumbling blocks to pathogenic analysis of these conditions is our ignorance of how the neonatal brain differs functionally from the adult's and we are perhaps too apt to relate our thinking about physiological matters to adult circumstances. In fact the neonatal brain and its environment seem to differ from the adult's in so many particulars that to think of them in conventional pathological terms is often misleading and sometimes irrelevant. Fruitful analysis of descriptions of pathological 'entities' must surely be made in terms of pathological mechanisms, and this ultimately means disordered physiological, and probably homeostatic, processes. Just as the physiology of the neonatal brain differs from that of the adult, so the consequences of pathological processes in the newborn are likely to differ strikingly from those due to similar causes in adults.

C. B. COURVILLE, of Los Angeles, who has written a good deal about cerebral anoxia in the past, has lately described[1] in detail the brains of five children aged 4 months to 3 years, with changes that he ascribes to paranatal circulatory disturbances. The lesions certainly show many of the features of anoxic damage met with at all ages. There are minimal degrees of cortical necrosis, confined to lamina II; a consistent loss of Purkinje cells, characteristic of anoxic damage; and necrosis of some of the basal ganglia such as the thalamus and globus pallidus. The cortical damage in these cases, however, was often very severe and massive; and the changes in the basal ganglia were more extensive than is usual in anoxia in the adult. In addition, two cases showed subcortical necrosis of the white matter with cyst formation, a lesion not seen in adult anoxia. No special predilection for certain cortical areas was noted, and we are not told whether Ammon's horn was involved in the damage—points that are particularly important in recognising adult anoxic damage.

In discussing the pathogenesis of these lesions COURVILLE emphasises that a negative birth history of brain damage does not necessarily exclude this as a mechanism and that it is often necessary to extract such a history by special questioning. He might have added that clinical signs of brain damage at birth, such as failure to suck, lethargy, and failure to cry normally, give very little indication of the amount of damage that has in fact occurred. This is fully revealed only with the passage of time. Furthermore, in the cases in which convulsions were a feature, he does not mention their character or severity, so one cannot tell whether or not these

1. Courville, C. B. 'Widespread softening of the cerebral grey matter in infancy.' *Bull. Los Angeles neurol. Soc.* 1960, 25, 72–88.

seizures, or the events associated with them, added anything to the original brain damage.

In assembling these cases which show so many superficial differences and pointing out where their basic similarities lie, COURVILLE has laid stress on the variants of the end result of anoxaemia, particularly in the context of birth trauma. Where so many intracranial and extracranial factors are operating, considerable variation in the end picture is to be expected. He does not suggest exactly how these lesions are brought about, but he believes they are derived primarily from circulatory disturbances. He does not attempt to explain how his findings differ from those in the anoxia of adults, of which he has had special experience. Since the clinical information was derived retrospectively, details of the condition at birth were meagre.

Little more can be learnt from such a historical type of enquiry about the intimate functional conditions involved in the failure of compensatory mechanisms during this stress period. These can be fruitfully approached only by direct observation and experiment. COURVILLE has certainly broadened our concepts of neonatal anoxic brain damage, but direct supporting evidence for his theses is still to be gathered.

J. B. CAVANAGH

Record-keeping—a Canadian Solution

A REALLY satisfactory method for the preparation and maintenance of case-records for cerebral palsy sufferers has not yet been devised, despite the expenditure of much time and money on the subject. This is not surprising, when the difficulties of the task are considered. If the case-records are to be comprehensive they have to cover a subject of many facets and diversities, and they should also form a continuing record over many years.

Cerebral palsy is not a single condition but a group of many conditions with different causations, producing a wide range of physical, intellectual and even emotional disabilities. The realisation of its extent, and the contributions that can be made by professional workers in different fields, has led in recent years to the inter-disciplinary approach to the subject. Everyone will agree on the theoretical soundness of this approach, but in practice communication between the different workers is a major stumbling block. Adequate case-records could integrate the information drawn from the various specialities and should thereby form a link between the specialists.

The problems of cerebral palsy extend over many years. Beginning with the factors before and at birth which may have produced the condition, continuing with the study of the deviations of early development, and the problems of training and teaching during the child's growing years, until the adult's adjustment into the community has to be considered. The case-records of an individual patient have to extend over at least two decades if they are to link the events at birth or earlier with the ultimate end-results.

The completed case-records of patients with cerebral palsy should fulfil these purposes:

1. *An inventory of information about the patient.*
2. *A record of the patient's progress.*
3. *A basis for the analysis of a group of patients.*
4. *A summary of the patient's previous investigations, treatment and experiences, for the physician or other workers.*
5. *A basis for research.*

Five years ago a group of doctors in Canada, appreciating the need for greater uniformity in the recording of cases of cerebral palsy, set up a committee to study this subject, led by Dr. PRESTON ROBB, medical director of the Cerebral Palsy Clinic at Montreal Children's Hospital, and sponsored by the Canadian Council for Crippled Children and Adults. This committee considered that the best way to approach the problem of record-keeping in cerebral palsy was by recording pertinent information on punch cards. The punch cards they devised, together with an explanatory manual, have now been published and may be purchased from the Council.*

* Canadian Council for Crippled Children and Adults, Inc., Suite 115, 31 Alexander Street, Toronto 5, Ontario.

The punch card is of the conventional, simple rectangular form (10″ × 8″), with a single line of holes around the four sides. The main group headings, in addition to year of birth and age when first seen, are birth history, neonatal status, anatomical diagnosis, aetiological diagnosis, clinical type, severity, location, associated defects, intelligence, investigation procedures and treatment, and epilepsy. Although 127 items are listed in the various groups there are some surprising omissions on the card. There is, for example, no indication of the family history or family environment, nor are the child's abilities recorded anywhere on the card. Although prenatal influence is indicated as one possible aetiological diagnosis there is only one item referring to the mother's health during pregnancy. This is found in the section on birth history, and is listed as 'prenatal bleeding' without any further subdivision into the cause or the severity of the bleeding, or the time of its occurrence in relation to the duration of pregnancy.

This is a praiseworthy but unsuccessful attempt to solve the problem of record-keeping in cerebral palsy. It is unfortunate that the method of punch-card analysis was chosen for this work. Punch cards of the kind chosen for hand sorting can be used for a limited number of cases—say 200–300—but above that number they become far too cumbersome to handle. In addition, errors can easily arise if the transfer of information to the cards is delegated to a junior clerk, as often happens, without any cross-checking. The main criticism is that the method fulfils only some of the purposes of case-records in cerebral palsy enumerated above. The cards are not a complete or satisfactory record of information about individual patients. For example, it is not enough to know merely that the child required resuscitation at birth. The duration of apnoea, the method of resuscitation adopted, the response to treatment, and so on, all need to be known. When a child has an associated defect of the eyes, it is not possible to indicate whether this means microphthalmia, strabismus or a refractory error. The cards are not, therefore, a complete record of individual cases. Then, not only is there no place on the card for recording the child's abilities, but progress and ultimate response to treatment are not indicated either. One might think that the cards were devised for adults in a static condition, but this cannot be so, because in one small corner there is the sub-group 'age first seen 0–2, 2–5 and 5+'. It is in these early years that the clinical picture of cerebral palsy is so variable, and opinions may have to be modified and even changed from time to time. The punch cards do not allow the flexibility that is so necessary for case records at this age, and they are quite unsuitable for following the progress of individual children.

The punch cards could be used, for example, in the analysis of a group of cases in an individual institution—to find out what proportion of children with athetosis are seen from year to year, or how many children are referred to the orthopaedic surgeon. Then the individual physician might find the cards useful for picking out cases for follow up, and possibly also as a reminder of what has happened to the children in the past. If he was doing this work at all seriously he would certainly need more extensive notes of his own, and would be using the punch cards merely as an index to his own notes. As a basis for future clinical research the punch cards also seem inadequate. Research in cerebral palsy

has surely passed the superficial stage of finding the proportion of various defects in the different kinds of cerebral palsy, and has reached a more sophisticated stage of deeper enquiry into basic mechanisms.

There may be some factor in Canada that makes this method more useful there than it seemed to be in this country. Comments from the Canadian centres who are using it, illustrating its applications and value in practice, would be especially welcome.

KENNETH HOLT

NOTICE

GRANTS FOR POSTGRADUATES IN THE U.S.A.

THE newly graduated American doctor on completion of his internship tends to be older and more mature and to have greater personal and family responsibilities than his British counterpart. If he wishes to pursue specialist training by undertaking a residency at a first-class hospital or to engage in investigative work he must either continue to sponge on his family, borrow from the bank or gain some other form of financial assistance. The majority do so in order to get sufficient postgraduate experience and training to satisfy the Board requirements of their chosen speciality. This would correspond roughly with a registrar's appointment and the gaining of the M.R.C.P. or F.R.C.S. At the end of this time the temptation to 'hang up one's shingle' and commence lucrative practice is overwhelming, and there are few who would be able or willing to spend time in research appointments without considerable financial help.

A little book published by the Association of American Medical Colleges[1] gives in synoptic form the type of financial aid that is available both for residency training and for research and training fellowships. It will interest anyone generally interested in the problem of inducing doctors to become contributors to medical knowledge and thought rather than pure practitioners, and it may be wondered whether the extensive system of personal grants to the enthusiastic which it describes may not be more effective than our own Welfare State approach. It is invaluable for those whose job it is to advise young doctors considering a period of study or research in North America, and to anyone wishing to acquire the B.T.A. (Been to America) diploma it is a most useful compendium.

Within its cardboard covers will be found a mass of detailed information which is reasonably well arranged, so that the person interested either in a subject or a particular institution can find what he wants. The important details of when, where and how to apply are given and there is sufficient information about requirements both of nationality and medical achievement to prevent anyone applying to a totally unsuitable place. It is made clear that for many of these awards applications from foreign doctors will be considered. Perhaps it should be stated that the publication does *not* give information about modes of entry into the U.S.A., travel grants, or the eligibility of foreign doctors to work in the institutions mentioned. It does, however, indicate the sources from which these important details can be obtained.

T. E. Oppé

[1] Financial Assistance available for Graduate Study in Medicine. Association of American Medical Colleges, 2530 Ridge Avenue, Evanston, Illinois, U.S.A., 1960, pp. 174, $2.50.

ORIGINAL ARTICLES

The Clinical Differentation and Physiological Nature of Increased Resistance to Passive Movement

THOMAS E. TWITCHELL, M.D.

From the Division of Neurology, Joseph P. Kennedy Jr. Memorial Hospital and Tufts University School of Medicine, Boston, Massachusetts

A FREQUENT concomitant of motor disorder resulting from lesions of the central nervous system is an increased resistance to passive movement, often called 'spasticity' or 'rigidity' or some other term. To the neurologist these terms have come to have some meaning and to have some basis in neurophysiological mechanisms, even though it is not yet completely understood. However, it is apparent from some of the recent literature that misconceptions have arisen regarding the meaning of these terms and their physiological nature. It may be well then to review some of the clinical features of various types of increased resistance to passive movement and to indicate something of their physiological nature.

Spasticity

The phenomenon of spasticity may be recognised clinically by a particular quality of resistance to passive movement. Thus, in passively stretching a spastic muscle one observes a certain range through which the muscle may be stretched without encountering any increased resistance. This is the 'free interval'. With continued stretch a resistance appears, minimal at first but gradually increasing to a maximum as stretch is continued and then fading away towards the end of passive stretch.

There is of course wide variation, both quantitatively and to some extent qualitatively, in the phenomenon of spasticity as it exists in each individual patient. The length of the free interval may vary, as well as the intensity of resistance following it. Therefore, and particularly after an acute lesion of the Rolandic cortex or its projections, the free interval may be extremely long and any increased resistance to passive movement may be felt only at the very end of passive stretch. With more intense spasticity, however, the free interval is shortened and the resistance appears earlier in the stretch of the muscle, but it continues to show the gradual increment which is characteristic of spasticity.

There are also some qualitative differences. The increase in resistance with continuing stretch may appear gradually in some patients and more abruptly in others. Rapid passive movement generally seems to produce a greater intensity of resistance than slow passive movement and also to cause a more abrupt onset of resistance (frequently described as a 'catch'). In like manner the decline in resistance toward the end of passive stretch may be rapid (a 'give') or it may be gradual. In the presence of clonic deep tendon reflexes there may be intermittent interruptions in the resistance as the muscle is being stretched, giving a quality similar to that of the 'cog-wheel phenomenon' in Parkinsonism. In some patients, after a short free interval, there is a marked abruptness of onset and rapidity of decline in resistance indicative of the so-called 'clasp-knife phenomenon'. In spite of these quantitative and qualitative differences, spasticity is generally revealed clinically by the association of the free interval with

gradually increasing resistance following it.

In most instances spasticity is associated with exaggeration of the deep tendon reflexes. However, in the presence of very intense spasticity the muscle may be so contracted that the reflexes are difficult or impossible to obtain. Sometimes the deep tendon reflexes may be exaggerated without spasticity being present. This is often seen early after the onset of an acute lesion, when hyperactivity of reflexes precedes the onset of spasticity, or at a later stage in nearly complete recovery, when spasticity may disappear even though the deep tendon reflexes remain exaggerated.

Following an acquired lesion of the Rolandic cortex or its descending pathways in the adult spasticity generally is distributed in certain muscle groups, these being the adductors of the shoulder and flexors of the upper extremity and the adductors of the hip and extensors of the lower extremity. Spasticity is usually more intense in the distal segments, and indeed in many patients the phenomenon may appear only in the wrist and finger flexors and in the ankle extensors. In patients with more intense spasticity in all the flexor groups of the arm and extensor groups of the leg one may occasionally find it also in the elbow extensors and knee flexors. (In patients with 'cerebral palsy' the 'spasticity' may have a different distribution, and this will be discussed later.)

It is most important to realise that spasticity is a variable phenomenon, as Mac Keith (1959) has recently reiterated, and that it is capable of modification by many reflex mechanisms. Stretch of the muscle concerned itself may alter it, for such is the nature of the lengthening and shortening reaction. Painful stimuli and extremes of temperature or infection may decrease or abolish it. The tonic neck reflexes are often extremely effective in modifying the distribution of spasticity in a limb, frequently inducing actual changes in resting posture of the limb. Not only may turning of the head to one side or another evoke the well-known 'fencer's position' of extension of the face limbs and flexion of the occiput limbs, but ventroflexion of the head on the trunk may cause flexion of both upper limbs and extension of both lower limbs, while dorsiflexion of the head may cause extension of the upper limbs and flexion of the lower.

It is important to note that although the tonic neck reflexes may not induce actual changes in the position of the limbs, they may alter the resistance to passive movement. For example, with the head turned to one side, even though there had been no change in limb position, one may detect an increase in resistance in the extensors of the face limbs and in the flexors of the occiput limbs. Turning the head to the other side may reverse the effect. The patient's voluntary movements of the head are more effective in inducing neck reflexes than passive movements of the patient's head effected by the examiner. Tonic labyrinthine reflexes may alter spasticity so that various increments or decrements in resistance occur depending on whether the patient is in the prone or supine position. Righting reflexes may also alter it, so that if the patient is lying on his side one may find increased flexion resistance in the upper lying limbs and increased extensor resistance in the lower lying limbs. It is therefore of the utmost importance to note the patient's position, and particularly that of the head in relation to the body, when determining the degree or distribution of spasticity in the limbs.

Spasticity itself is the result of simple uncomplicated exaggeration of the spinal stretch reflex. Denny-Brown, Twitchell and Saenz-Arroyo (1949) pointed out that spasticity resulted as a release of proprioceptive reactions following abolition of certain contact reactions which normally condition the stretch reflex. These reactions are the instinctive grasp reaction and the grasp reflex. These contact reactions are normally in equilibrium with the proprioceptive stretch reflexes and actually serve as a triggering mechanism for the stretch

reflex as in the grasp reflex (Seyffarth and Denny-Brown 1948).

Following a lesion of the pre-central Rolandic cortex the contact reactions are abolished and the proprioceptive stretch reflex is consequently released to hyperactivity. Conversely, in recovering hemiplegia it has been shown that spasticity disappears with the return of the grasp reflex and instinctive grasp reaction (Twitchell 1951). The relationship of the gamma fibre motor system to spasticity has been discussed by Rushworth (1959), who with Denny-Brown (1959) has also demonstrated the role of the gamma fibre system in both the tactile and proprioceptive phases of the grasp reflex.

Clonus and the clasp-knife phenomenon are not a *sine qua non* for the diagnosis of spasticity. These are epiphenomena and result from some kind of modification of the proprioceptive stretch reflex by other mechanisms. The role of a contactual mechanism in the genesis of clonus has been shown in the decerebrate cat, in which clonic claw jerks and sustained clonus are markedly intensified when the dorsum of the paw is deafferented, but are completely abolished when the plantar surface is deafferented, after which procedure simple exaggeration of the stretch reflex as spasticity remains (Denny-Brown *et al.* 1949).

As the observer becomes more sophisticated in his examinations of the nervous system, and encounters a greater variety of patients, he soon finds that he less frequently encounters uncomplicated simple exaggeration of the stretch reflex. He realises that, although he may detect a free interval followed by a rise in resistance to passive movement, there are variations in the resistance which make him suspect that the 'spasticity' is being contaminated by other effects. For example, he may encounter a form of resistance which, after a short free interval, is more plastic and relatively constant throughout the range of passive movement, somewhat resembling the rigidity of extrapyramidal disease. Such differences must be noted and described rather than loosely recorded as just 'spasticity', for only from well-documented cases can eventual clinical-anatomical correlation be obtained.

Rigidity

Little need be said of the clinical aspects of true extrapyramidal rigidity as seen in Parkinsonian syndromes. It is differentiated from spasticity by the apparent absence of the free interval and a different quality of resistance to passive movement throughout the stretch and is present in both agonists and antagonists of a joint. It therefore has aptly been compared to the resistance felt when bending a lead pipe. Although actually a short free interval can be demonstrated with difficulty, in the usual clinical examination it is not apparent. In some patients relatively rhythmical interruptions in the resistance as the limb is manipulated produce the so-called 'cog-wheel effect'. This does not, however, indicate a different 'type' of rigidity, as some have suggested.

The main reason for mentioning the phenomenon of rigidity here is to dispel some of the misconceptions appearing in some of the recent literature on cerebral palsy and rehabilitation, which have stated that a stretch reflex is present in spasticity but not in rigidity. The stretch reflex is a basic ingredient in movement and posture, both normal and abnormal. Simple uncomplicated exaggeration of the stretch reflex results in spasticity, but in rigidity the stretch reflex has an extremely facile lengthening reaction which tends to bring the response in a motor unit back to or near the starting equilibrium from the very beginning of passive stretch. In rigidity the lengthening reaction occurs unit by unit, while in spasticity one encounters a lengthening reaction of the whole muscle towards the end of passive stretch.

Dystonia

Dystonia has been characterised as a form of increased resistance to passive movement which is essentially an abnormal attitude (Denny-Brown 1947). It is usually

more intense than either spasticity or rigidity. There is a 'springy' quality to the resistance, so that the displaced limb when released will fly back to its original position. Denny-Brown (1958) has recently pointed out the relation of tonic grasping or avoiding responses* to the phenomenon of dystonia and the consequent relation of dystonia to reflexly determined contactual reactions. Thus, a tonic grasp reflex may produce a dystonic posture of flexion and adduction of the fingers and toes, inversion of the foot and supination of the hand. Tonic avoiding responses yield a dystonic pronated hand with extended and abducted fingers or an everted foot. Certain dystonic postures of the head and eyes may be related to pursuit or adversive reactions of the head and eyes elicited by tactile or visual stimuli.

Gegenhalten

Occasionally one encounters a peculiar inconstant form of resistance to passive movement in which the patient appears to be voluntarily opposing an attempt to displace a limb. However, this resistance may be encountered in a comatose patient in whom no voluntary activity is possible. It is generally more intense in the extensors of the limb than in the flexors. It is often seen in the 'normal' limb soon after the onset of sudden hemiplegia in the adult, leading the uninitiated observer to believe there is greater 'spasticity' on the unaffected side or that he is dealing with a quadriplegia. This peculiar resistance is the phenomenon which Kleist (1927) called '*Gegenhalten*'. It often accompanies frontal lobe lesions and in Kleist's series lesions of the thalamus. It is commonly associated with the grasp reflex and sucking response. It is now clear that the phenomenon of '*Gegenhalten*' is actually related to the exaggerated contact reactions of the palm or sole, by which contact with the hand or foot induces some reflex extension of the limb. If the limb is manipulated by the forearm or leg, this resistance may diminish or even disappear.

Increased Resistance in Cerebral Palsy

Some additional remarks are necessary regarding the phenomenon of increased resistance to passive movement as it appears in various syndromes of cerebral palsy. The phenomena of spasticity, rigidity, some forms of dystonia and other types of increased resistance which are encountered frequently by the neurologist have been studied usually in adults, and indeed experimental studies have generally been done in mature animals. To equate these types of resistance to those seen in patients with congenital or early acquired encephalopathies of childhood may be in error, for in the adult group a lesion has been interposed on a relatively 'static' nervous system in the developmental sense, while in the other group a lesion has been interposed on a relatively rapidly developing or maturing nervous system.

In patients with infantile spastic diplegia or quadriplegia one is impressed with certain differences in the increased resistance to passive movement when compared to 'similar' syndromes acquired in later life. In some patients with an infantile spastic diplegia or quadriplegia the resistance to passive movement does resemble that of spasticity, in that one may detect a free interval followed by a gradually increasing resistance to passive movement, which then melts away. However, many patients do not reveal simple spasticity, but a rather 'plastic' resistance to passive movement indicating complicating factors. In some patients there is exaggeration of deep tendon reflexes, but not in all. However, in many patients with infantile spastic syndromes the resistance is distributed differently from that in the adult with an

* The avoiding responses are automatic withdrawal reactions induced by visual or tactile stimuli and frequently appear in the limbs opposite a parietal lobe lesion and in all forms of cerebral palsy. They may interfere with intended movement by causing more flexion of the upper extremity away from an object reached for, over-flexion of legs while walking, and in some patients adversive movements of head and trunk. The effect of these reactions on motor function in infantile cerebral palsy are discussed in more detail in my paper on bilaterial athetosis (Twitchell 1959).

acquired lesion to the nervous system. We have been impressed, therefore, by the plastic resistance occurring in the flexors and adductors of both upper and lower extremities in patients with infantile spastic syndromes, and we have been impressed with the relatively greater proximal distribution of increased resistance in these patients as compared to patients with a spastic syndrome resulting from a lesion acquired later in life. Indeed, many of the patients with congenital encephalopathy show a quite intense resistance to passive movement in the shoulders, elbows, hips and knees, but little or none in the wrist and fingers, ankles and toes.

We have previously discussed (Twitchell 1959) the relation between certain reflex phenomena in the patient with double athetosis and those of the normal infant, pointing out that there is the same physiological mechanism in both and suggesting that the motor deficit in double athetosis results as a defect in sensory-motor integration (maturation), with a corresponding hypertrophy of infantile reflex mechanism. In this regard one is reminded of Anton's suggestion (quoted by Freud 1901) that the resistance to passive movement in infantile spastic syndromes represents the retention of the peculiar 'hypertonus' of the infant. Certainly the presence of resistance in both flexors and adductors of upper and lower extremities, its more proximal distribution, and more plastic quality are similar in these two groups (Twitchell, unpublished observations). From our studies to date it appears that the form of plastic resistance in flexors and adductors in proximal limb segments both in patients with cerebral palsy and in the normal infant is intimately related to a tonic-labyrinthine reaction.

In some patients with so-called 'spastic' forms of cerebral palsy, resistance to passive movement may not be encountered if the patient is completely at rest, but may become quite intense during active movement of the head or when the patient is held in certain positions. In these patients the resistance is quite clearly related to neck and labyrinthine reflexes. Again it is therefore important to give careful attention to the patient's position, and particularly to his movements, since many children are restless and fidgety during examination and such movements themselves, particularly when they involve the head, may alter resistance to passive movement in the limbs.

Another interesting feature in some patients with the infantile spastic syndromes is the decline in intensity of spasticity over a period of many years. The nature of this decline is not yet clear. Its mechanism may be similar to that which alters the normal 'hypertonus' in the newborn over a period of months. Our own studies of the maturation of motor function in the normal infant suggest that the initial hypertonus is related to tonic-labyrinthine reactions early modified by neck reflex and traction responses which themselves are eventually conditioned by other reactions. Further study is needed, but we believe that this gradual diminution in normal infantile hypertonus may be related to a mechanism similar to that seen in the adult after an acute lesion of the nervous system, when recovery had reached a relatively complete stage and where spasticity disappears abruptly with the recovery of the grasp reflex mechanism.

Spasticity has not always been considered a usual concomitant of infantile double athetosis. We are convinced that in cerebral palsy pure bilateral athetosis seldom occurs without spasticity, and in like manner spastic diplegia or quadriplegia is rare without elements of athetosis. Nevertheless, in some patients there is clearly neither a 'spastic' phenomenon nor the form of plastic proximal resistance described above, but there is an increased resistance to passive movement which is inconstant and is not related to exaggeration of neck, labyrinthine or righting reflexes. We (Twitchell 1959) have discussed this form of resistance as it occurs in double athetosis and have pointed out that it is related to the contactual reactions of the hand or foot. Consequently in the presence of an exaggerated grasp reflex one

may encounter a resistance in attempts to flex the limbs passively, and such resistance may be similar to that of '*Gegenhalten*'.

In most patients with cerebral palsy, however, the avoiding responses are prepotent and may induce a form of flexor resistance in a limb. We have noted, for example, that in some patients, if one grasps the limb by the hand, there is an intense resistance to attempts at passively extending a limb. Contact with the hand itself produces a marked avoiding response, causing increased flexor resistance of the upper extremity which can be displaced only with difficulty. However, if the limb is manipulated by the forearm this resistance disappears entirely and the limb is quite hypotonic. We have previously discussed the relationship of the unbalanced grasp reflex and avoiding response in the genesis of athetosis. It is clear, therefore, that these conflicting responses can induce the form of intense resistance to passive movement which Foerster (1921) and Wilson (1925) noted to be present during the spontaneous postures of athetosis. We would suggest that this is also the mechanism which produces the so-called 'tension athetosis' of Phelps.

Finally one should probably mention one other complication which is too frequently seen in patients with untreated cerebral palsy. This is the phenomenon of myostatic contracture. From our own experience it is clear that in a few patients the resistance to passive movement is almost entirely on the basis of contracture, while in others the phenomenon of spasticity or plastic resistance is altered both qualitatively and quantitatively by the additional complicating factor of contracture. It is, therefore, important to consider this complicating factor in the evaluation of increased resistance to passive movement.

In conclusion, we must emphasise once more the importance of a careful and detailed evaluation of resistance to passive movement in each individual patient, with particular regard to physiological mechanisms which may alter or condition such resistance. A careful description of the phenomenon is far more important than the mere attachment of a 'name' to it.

SUMMARY

Spasticity is a phenomenon resulting from simple uncomplicated exaggeration of the spinal stretch reflex and is recognised by a gradually increasing resistance to passive movement, following a 'free interval' in which no increased resistance is obtained. Deep tendon reflexes are usually exaggerated in the presence of spasticity, but clonus and the sudden 'give' of the 'clasp knife' effect are epiphenomena representing complicating factors. The classical rigidity of parkinsonism is also based on the stretch reflex but here there is also an extremely facile lengthening reaction. Other forms of increased resistance to passive movement, particularly in the 'cerebral palsies', are more clearly related to conflicting tonic neck, labyrinthine and righting reflexes. Again, in the 'cerebral palsies', disequilibrium between grasp reflexes and avoiding responses may lead to increased resistance to passive movement determined by stimulation of these exaggerated contact reactions.

RÉSUMÉ

La différentiation clinique et la nature physiologique de l'augmentation de la résistance à la mobilisation passive.

La spasticité est un phénomène résultant d'une exagération simple et non compliquée du réflexe spinal d'élongation et se reconnaît par une résistance à la mobilisation passive, augmentant progressivement, après un intervalle libre au cours duquel on n'obtient pas d'augmentation de la résistance. Les réflexes tendineux sont généralement exagérés en cas de spasticité, mais le clonus et le 'déclic' de l'effet de 'canif' (clasp-knife) sont des épiphénomènes représentant les facteurs de complication. La rigidité classique du parkinsonisme

repose aussi sur le reflexe d'élongation, mais il se produit de plus ici une réaction extrêmement facile d'allongement. Les autres formes de résistance accrue à la mobilisation passive, notamment dans les infirmités motrices cérébrales, sont plus nettement en rapport avec les reflexes, tonique du cou, labyrinthique et de redressement, qui sont opposés. De plus, dans les infirmités motrices cérébrales, le déséquilibre entre le réflexe d'étreinte et les réactions de fuite peuvent conduire à une résistance accrue à la mobilisation passive déterminée par la stimulation de ces réactions de contact exagérées.

ZUSAMMENFASSUNG

Die klinische Unterscheidung und die physiologische Beschaffenheit der Steigerung des Widerstandes gegen passive Bewegung.

Spastizität ist eine Erscheinung, die durch eine einfache nicht komplizierte Übertreibung des spinalen Streckreflexes zustande kommt und die an einer graduellen Zunahme des Widerstandes gegen passive Bewegung, nach einem 'freien Intervall' während dem man keine Zunahme des Widerstandes erlangt, erkennbar ist. Die tiefen Sehnenreflexe sind bei Spastizität meistens gesteigert, aber der Klonus und das 'Schnellen' des (clasp-knife) Taschenmesser-Effektes sind Epiphänomene, die Komplikationsfaktoren darstellen. Die klassische Rigidität des Parkinsonismus beruht ebenfalls auf dem Streckreflex aber hier findet sich ausserdem noch eine sehr erleichterte Ausdehnungsreaktion. Die anderen Formen des gesteigerten Widerstandes gegen passive Bewegung, besonderes bei Zerebrallahmung, stehen deutlicher in Beziehung mit den entgegengesetzten tonischen Nacken 'Labyrinth' und Aufrichtungsreflexen. Ausserdem, kann bei Zerebrallähmungen die Gleichgewichtstörung zwischen den Greifreflexen und den Fluchtreaktionen zu gesteigetem Widerstand gegen passive Bewegung, durch Stimulation dieser übertriebenen Kontaktreaktionen bestimmt, führen.

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Galactosaemia

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GALACTOSAEMIA is due to an inborn error of metabolism, transmitted by inheritance as a recessive condition. It is characterised by a specific inability to metabolise the galactose which the hydrolysis of lactose in the intestine produces together with glucose.

The condition was first described in 1908 by von Reuss but a genetic basis for the disorder was not suggested until Goppert did so in 1917. The condition is uncommon but with a growing awareness of the disorder, more cases are being recognised each year.

The biochemical defect has been fully worked out during the past few years, following the basic work of Leloir (Leloir 1951, Leloir and Cardini 1953) and Kalckar (Kalckar *et al.* 1953) in defining the normal pathway of conversion of glucose to galactose.

At least three distinct steps, each catalyzed by a separate enzyme, are required to enable galactose to enter the main stream of carbohydrate metabolism.

Reaction A

In the first reaction, galactose is phosphorylated to galactose-1-phosphate, thus:

Galactose + adenine tri-phosphate ⟶ galactose-1-phosphate + adenine diphosphate.

This reaction is catalysed by the enzyme *galactokinase*, and may be more fully set out as:

$$\text{Galactose} + \text{ATP} \xrightarrow{\textit{galactokinase}} \text{galactose-1-phosphate} + \text{ADP}.$$

(or in brief: galactose + ATP $\xrightarrow{\textit{galactokinase}}$ gal.-1-P + ADP.)

Reaction B

In the second of the three reactions, the galactose-1-phosphate (gal.-1-P) so formed by Reaction A is converted into glucose-1-phosphate (gl.-1-P) by an enzymic mechanism involving uridine-diphosphate-glucose (UDPgl.) as co-enzyme.

Galactose-1-phosphate (gal.-1-P) + uridine-diphosphate-glucose (UDPgl.) $\rightleftharpoons$ glucose-1-phosphate (gl.-1-P) + uridine-diphosphate-galactose (UDPgal.)

or, more briefly: gal.-1-P + UDPgl. $\rightleftharpoons$ gl.-1-P + UDPgal.

More recently Kalckar and his colleagues (Maxwell *et al.* 1955) have shown that this Reaction B requires the presence of an enzyme, *phospho-galactose-uridyl transferase*, or *P.gal. transferase*. Reaction B is therefore more completely set out thus:

$$\text{Gal.-1-P} + \text{UDPgl.} \xrightleftharpoons{\textit{P.gal. transferase}} \text{gl.-1-P} + \text{UDPgal.}$$

The uridine-diphosphate-galactose (UDPgal.) which is formed acts as an intermediate, for it is later reconverted to uridine-diphosphate-glucose (UDPgl.) as shown in Reaction D below.

Reaction C

In the third step, the glucose-1-phosphate formed from galactose-1-phosphate in Reaction B is converted either into glycogen by means of phosphorylase or into glucose-6-P by means of phospho-glucomutase.

Reaction D

The UDP-galactose formed in Reaction B is reconverted to UDP-glucose in a reaction involving a specific *epimerase*:

$$\text{UDP-galactose} \underset{\longleftarrow}{\xrightarrow{\text{4-epimerase}}} \text{UDP-glucose.}$$

This UDP-glucose is then once more available to take part as co-enzyme in Reaction B, converting galactose-1-P into glucose-1-P.

An exciting first step was the discovery by Schwarz and his co-workers (Schwarz *et al.* 1956, Komrower *et al.* 1956) that erythrocytes of patients with galactosaemia accumulate galactose-1-phosphate (gal.-1-P) when exposed to galactose, revealing the block in Reaction B. This observation was confirmed and the explanation given by Kalckar and his colleagues (Kalckar *et al.* 1956, Isselbacher *et al.* 1956), who demonstrated the absence of the enzyme gal.-1-P uridyltransferase (P-gal. transferase) while showing that 4-epimerase was present. The implication is that because of the reversibility of this reaction the patient with galactosaemia can, while on a galactose-free diet, synthesise essential galactose.

Inheritance

The mode of transmission of galactosaemia has been clarified only recently. Holzel and Komrower (1955) attempted to determine the mode of transmission by examining the response of patients' near relatives to the galactose-tolerance test, which is grossly abnormal in cases of the disease. The near relatives in four families were all examined. Although several instances of abnormal galactose tolerance were obtained, in one family only did they find clear evidence that both parents had an abnormal tolerance for galactose. This evidence suggested a simple Mendelian inheritance of an autosomal recessive gene, but it was not until 1959 that Kirkman and Bynum, followed by Bretthauer and Donnell (Bretthauer *et al.* 1959, Donnell *et al.* 1960) were able to confirm this suggestion and show that the patient is homozygous and both parents heterozygous for the condition. Kirkman employed a manometric method for assay of the enzyme, while Bretthauer modified Kalckar's original transferase assay to permit measurement of intermediate enzyme activity.

Pathology

The main changes are found in the liver. There is a periportal fibrosis with occasional areas of degenerating or necrotic cells, usually adjacent to portal tracts, and swelling of parenchymal cells due to fatty infiltration with vacuolation of the cytoplasm (Bell *et al.* 1950). In addition one sees a rosette-like arrangement of liver cells adjacent to a dilated canaliculus which is often filled with bile pigment: glycogen is present in varying amounts (Donnell *et al.* 1960). The renal lesion is situated in the epithelial cells of the proximal and distal convoluted tubules; the cells are dilated and swollen with vacuolation of the cytoplasm (Bell *et al.* 1950). In addition, dilatation of the convoluted tubules has been described (Hudson *et al.* 1954), and we have seen a hyaline-like precipitate in the distal tubules and in the widely dilated convoluted and collection tubules. In the brain there is considerable pericellular and perivascular oedema and swollen pale nuclei in many of the oligodendroglial cells.

The earliest histological changes in the lens of the eye are peripheral opacities

which appear in the equator of the lens and gradually spread anteriorly to produce a complete anterior opacity (Ritter and Cannon 1955).

Clinical Picture

The disorder may present in one of two ways. In severe cases symptoms may appear during the first two weeks of life. Vomiting is usually the first indication of any disturbance and this is followed by jaundice and loss of weight. The liver enlarges steadily and may descend below the level of the umbilicus, ascites may develop and the spleen may often enlarge. The infant is reluctant to feed and is lethargic; there is marked hypotonia with failure to thrive and the stools may be loose and frequent. Cataracts develop in more than half the cases and may appear as early as the third week. There is a marked tendency to infection in the untreated or inadequately treated infant.

In a second group of cases the development of symptoms and signs may be slow and, as a result, the infant is not brought forward for examination for several months. Difficulty with feeding, occasional vomiting and retarded development are the presenting symptoms and on examination hepatomegaly is found and often cataracts. The infant is not acutely ill.

Galactosuria and proteinuria are found in untreated cases, the galactose being readily demonstrated in the urine by paper chromatography (Bickel and Hickmans 1952). These signs, however, may not present in children diagnosed after the age of two years, when the normal diet contains appreciably smaller quantities of milk.

The *diagnosis* is confirmed by the presence of an elevated blood-level of galactose and by the grossly abnormal galactose-tolerance test, which shows high levels of galactose for several hours; in addition, between 40 and 50 per cent of the ingested galactose can be recovered from the urine. Since the blood-glucose levels may be markedly depressed during this investigation to below 30 mg./100 ml., it is suggested that the galactose-tolerance test should not be done unless it is difficult to establish a diagnosis without its assistance.

A simple ward testing of the urine, first with Benedict's solution and secondly with the glucose-specific glucose-oxidase preparation ('Clinistix', 'Testape'), should give considerable help in cases under investigation; in cases of galactosaemia the former test will be positive and the latter negative, showing that the reducing substance is not glucose (and is probably galactose). In this context it must be remembered that galactose disappears from the urine within 48 hours after its exclusion from the diet, and as these infants are dehydrated and vomit readily they may be on a glucose-saline regime when the urine is collected. In this way the diagnosis may be missed and I know of more than one case where it was delayed on this account.

Proteinuria is a constant feature, the amount being appreciable, rising to more than 1 gramme per day: electrophoresis of this protein has shown fractions corresponding to the normal range of serum proteins.

Amino-aciduria in galactosaemia was first described in 1952 (Holzel *et al.* 1952, Hsia *et al.* 1954, Bickel and Hickmans 1952); it is generalised but with a predominance of neutral aliphatic acids such as glycine, alanine, serine, glutamine and threonine. It has been shown that this finding is the result of defective tubular reabsorption and is not an overflow phenomenon (Komrower 1953). The galactosuria, proteinuria and amino-aciduria all disappear when lactose or galactose is removed from the diet (Komrower *et al.* 1956, Holzel *et al.* 1957).

In untreated infants there is evidence of some disturbance of liver function: a rise of serum bilirubin and serum alkaline phosphatase and a prolongation of the prothrombin time. The serum glutamic oxalo-acetic transaminase is usually raised. The figures do not compare with the

abnormality of galactose tolerance and usually return to normal when the milk or lactose-containing feeds are discontinued, although in cases in which treatment is appreciably delayed irreversible liver damage is sustained, with the ultimate development of a portal cirrhosis (Holzel *et al.* 1958).

Two further techniques which have been mentioned earlier can be employed to confirm the diagnosis: the first is based on the observation of Schwarz *et al.* (1956) that gal.-1-P accumulates in the erythrocytes of cases of galactosaemia when they are exposed to galactose either in vivo or in vitro. The phosphorylated derivatives are isolated by barium salt precipitation, and the galactose-1-P and glucose-1-P are selectively hydrolysed to free galactose and glucose. These sugars are then separated chromatographically and the amount of galactose is estimated by comparison with known quantities chromatographed simultaneously.

The second is the method developed by Kalckar and his colleagues to establish the aetiology of the disorder. The test measures the uridine diphosphoglucose (UDPG) utilised when a haemolysate of erythrocytes is incubated with appropriate amounts of substrate (Reaction B). In the homozygous galactosemic virtually no UDPG is used, revealing an absence of enzyme (Kalckar *et al.* 1956).

Treatment

The essentials of treatment are the exclusion from the diet of all milk and other substances containing lactose or galactose and correction of any dehydration or acidosis (Holzel *et al.* 1957, 1958). The very sick infant will certainly require first intravenous or subcutaneous fluids, then clear fluids by mouth, and finally the lactose-free diet. Intravenous Hartmann's or Butler's solution mixed with equal parts of a 10 per cent dextrose solution are suitable preparations, as they would help to correct the hypoglucosemia, the acidosis and the lower serum potassium: either of these mixtures could then be given by mouth for a short time.

Most of the special milks prepared for these children do, in fact, include small quantities of lactose, but a casein hydrolysate preparation ('Nutramigen') has been widely used with success as it does not contain lactose. Soya products are often recommended because they are lactose-free, but they contain a tetra-saccharide (stachyose) which includes two molecules of galactose. Discussion has centred around the possibility of intestinal hydrolysis of stachyose, since there is clinical evidence that infants on these preparations do not thrive well (Schwarz *et al.* 1959), and we feel that these substances should be excluded from the diet until it can be shown that hydrolysis does not take place. Recently a case of induced hypothyroidism has been reported in an eczematous infant given a soya-bean preparation (Van Wyk *et al.* 1959). For these reasons a lactose-free feed was introduced by Holzel (Holzel *et al.* 1958). This is based on a milk-free diet devised by Moll and Stransky, and consists of egg, sugar, vegetable margarine and rice flour (*see* Appendix). It is a high-carbohydrate feed and may cause some gastrointestinal disturbance in very young infants. In order to prevent any vomiting or diarrhoea it is important to begin with dilute feeds and to increase the strength and caloric value very slowly. As a result the initial weight gains are minimal, although the child's general condition improves very quickly and the symptoms and signs regress. 'Abidec' (0.5 ml. daily) has been given to supply the necessary vitamins and also orange juice or rose-hip syrup; these fruit drinks will augment the potassium intake. It should be remembered that vitamin C and other tablets are often made up with lactose, and care must be taken when their use is contemplated. In addition, either calcium chloride or calcium gluconate (0.75 g. daily) should be given twice daily to supplement the low calcium content of the diet. It is advisable to proceed to mixed feeding as

soon as the infant has become stabilised on the egg/cereal mixture.

Apart from the occasional gastro-intestinal disturbance mentioned above this diet has one other disadvantage—that its protein content is relatively low (approximately 1.5 per cent). I have tried a modification of the regime once the infant is stabilised on the Moll's pudding by giving equal parts of this preparation and low-lactose Cow and Gate food. This food contains less than 0.1 per cent of lactose and the total amount of galactose given in one month did not exceed 0.6 g. This was tried in two cases; the weight gains were good, there was no galactosuria or proteinuria and the few erythrocyte gal.-1-P determinations seemed to be satisfactory (17–30 μg./ml. gal.-1-P); and the two children, now aged 3 and 2 years respectively, are bright and happy. Nevertheless one feels that this approach should not be encouraged until we have gained more experience with this diet by keeping a careful watch on the urine and blood in the early months and by assessing the children's mental development when they are older.

This careful exclusion of lactose from the diet should be maintained for three years, when a small amount of milk or butter can be allowed in the cooking. We have not permitted cheese in the diet until the fourth year, and we do not propose to allow the consumption of any milk drinks or milk foods (for example, ice cream) while the children remain under our care.

Prognosis

In all the discussions on galactosaemia the prognosis has been considered to be gloomy, first, in respect to early death and secondly because of certain complications such as cirrhosis of the liver, cataract and mental deficiency (Cox and Pugh 1954, Mortensen and Sondergaard 1954).

A greater appreciation of the disorder and its more prompt diagnosis and treatment has lessened the mortality rate and has reduced the chance of irreversible lenticular and liver damage; it is most encouraging to witness the resolution of the cataracts and the return of liver function to normal following the introduction of a lactose free diet.

The frequency of mental retardation in many of the cases described has led people to believe that it is a constant feature of the disorder. Mason and Turner (1935) first suggested that persistent hypogiycaemia might be the reason, but serial blood-glucose estimations made in patients kept on a milk diet do not show a marked hypoglucosaemia: also galactosaemia differs greatly in its clinical picture from hyperinsulinism and glycogen storage disease, disorders characterised by hypoglycaemia (Bruck and Rapaport 1945).

The possibility of a genetic origin of the mental retardation, independent of the metabolic disorder, has been suggested (Clay and Potter 1955). There is no evidence, as yet, to support the conception of an inherited defect of mental development and we believe the view expressed by Townsend (Townsend *et al.* 1951) 'that mental retardation is a salient complication of the disorder', is not justified. We have personal experience of eight children aged between 9 years and 2 years in whom the diagnosis was made early and who show normal mental development. Donnell has described several more (Donnell *et al.* 1960).

It should be emphasised here that most of the feeds which have been given to patients described in the literature contained small amounts of lactose. This, over a long period of time, may have had a cumulative and therefore a deleterious effect upon cerebral development (*vide infra*); in addition, in many cases there had been repeated defections from the diet. Maintenance of a lactose-free diet for at least three years has been emphasised and it is believed that this has an important bearing on the prevention of mental retardation.

Pathogenesis

My colleagues and I have suggested previously that galactose is not the damaging factor in this condition (Holzel

et al. 1957), and we believe that the accumulation of gal.-1-P in erythrocytes and the cells of other body organs (cf. liver, kidney, lens and brain) produces a disturbance of cell metabolism which gives rise to the clinical picture of galactosaemia. We consider that the continued presence of small quantities of dietary lactose or galactose permits of this situation as Reaction A works normally but Reaction B not at all, and the alternative pathway suggested by Isselbacher has no appreciable effect in infancy (Isselbacher 1959).

This pathway:

gal.-1-P + U.T.P. $\rightleftharpoons$ UDPgal.

(uridine triphosphate)

+ pyrophosphorylase

requires the enzyme uridine diphosphogalactose pyrophosphorylase, which has been found in liver and brain but not in erythrocytes.

The extent to which any organ will be upset depends either on the actual accumulation of gal.-1-P or on the immaturity or sensitivity of the tissue, and to exemplify these points, the liver handles the major part of ingested galactose and of necessity there will be a correspondingly large amount of gal.-1-P, whereas immature brain cells are notoriously sensitive to metabolic upset even though this may be relatively slight.

The evidence brought to support this assertion is based on the initial observations made by Schwarz: (1) there is a marked impairment of respiration when galactosaemic erythrocytes are pre-incubated in a galactose-glucose medium compared with the respiration of cells pre-incubated in a glucose medium; and (2) there is an accumulation of gal.-1-P in red cells of untreated cases or when galactosaemic erythrocytes are incubated in a glactose medium.

There is additional information to add to these basic observations. Schwarz and Golberg showed an accumulation of the phosphate in cataractous lenses of rats fed a high galactose diet, the figures being about twelve times those found in non-cataractous lenses of galactose fed animals (Schwarz and Golberg 1955). Schwarz (1956) also demonstrated that chicks fed a high galactose diet who developed fits had an increased amount of gal.-1-P in the brain. More recently there has been an opportunity to analyse certain organs from two galactosaemic patients who died. Gal.-1-P was detected in the liver, kidney, heart, tongue; in gall-stones in the one case where they were present, and in the brain in the one case where it had been adequately preserved (Schwarz 1960).

The gal.-1-P, once present in the cells, takes time to be metabolised and interferes with cell metabolism, possibly by the inhibition of interconversion of gl.-1-P to gl.-6-P by the enzyme phosphoglucomutase, or by inhibiting the enzymes glucose-6-phosphatase and dehydrogenase (Sidbury 1957, Ginsburg and Neufeld 1957, Lerman 1960), and the developing immature brain is among the many body cells affected.

In 1954 Lockhart and Roboz suggested that persistent galactosaemia develops in the mother during the last weeks of pregnancy, and as a result considerable amounts of galactose cross the placenta into the infant's circulation; in this way they tried to explain the early onset of severe symptoms in some of the children. Although the hypothesis presented was exciting, in the case described the evidence was unconvincing; in 1958, however, Schwarz described a test on cord blood (*vide infra*) in which the level of gal.-1-P in the cord-blood erythrocytes was at least five times the figure found in normal children. The mother had been watched during her pregnancy, she had not been allowed extra milk, no galactose had been detected in her venous blood on two occasions after the consumption of one pint of milk, no galactosuria was detected, and no galactose was found in the amniotic fluid at delivery.

This finding suggested the possibility of the exposure of the foetus to transient but repeated maternal galactosaemia with slow accumulation of gal.-1-P in the foetal cells. Although in this instance the figure (51 μg. gal.-1-P) was not high when compared with the levels in untreated infants (300–400 μg.) and the child's progress up to three years has been excellent, it is possible that higher levels with consequent brain damage might occur in certain cases. These children will obviously be benefited by early diagnosis and efficient treatment but sufficient intrauterine damage may have occurred to limit the extent of subsequent mental development.

This idea of an intrauterine environmental metabolic disturbance is important and further studies must be made on cord-blood to see if this single observation holds in most cases.

Current Work

1. *Early Detection of the Disorder.* In some centres a routine examination of the urine is made to exclude the diagnosis of phenylketonuria. Guest and his colleagues (Berry *et al.* 1960) in Cincinnati have started collecting urine specimens dried on small pieces of filter paper from the babies born in the maternity units in the city. These filter papers are returned to the hospital and are examined for phenylpyruvic acid, glucose, galactose, protein and chondroitin-sulphuric acid; in this way they hope to detect, in addition to other disorders, the galactosaemia with a subacute onset.

In families in which there is a proved or suspected case of galactosaemia an examination can be made on the cord-blood of the newly born members (Schwarz *et al.* 1958).

We have carried out this procedure on four occasions, using the chromatographic technique of Schwarz, and have detected a case of galactosaemia within 36 hours of birth. In addition, Kalckar's enzyme technique can be used on cord-blood to detect the presence or absence of transferase activity. Within the last few months a simplified test has been devised by Schwarz which could be used in 'galactosaemic families' or in the examination of backward children in institutions or of cataractous babies. This test is based on the inherited deficiency of uridyl transferase and the consequent inability of haemolysed erythrocytes to respire on a galactose phosphate as a substrate (Schwarz 1960).

2. *Value of gal.-1-P Determinations in the Conduct of a Case of Galactosaemia.* In the previous sections I have marshalled the arguments that have led my colleagues and myself to emphasise the importance of the diet and its relation to the level of gal.-1-P in the tissues. We believe that any constant deviation from the diet, however small, will be reflected in the erythrocyte gal.-1-P figures and we have had the opportunity to study this in three infants. The method used was a minor modification of the chromatographic technique described in 1955 and in two cases it was possible to detect a rise, found to be due to the use of butter instead of vegetable margarine (Schwarz 1960). One of our difficulties has been to decide on a 'normal' level for treated galactosaemic infants, as the figures are higher than in unaffected controls however adequate the diet would appear. Secondly, the levels in the erythrocytes can only give an indication of the general situation in other tissues and will not necessarily give a measure of safety since this level may vary from tissue to tissue. Nevertheless it seems reasonable to assume that the tissue levels will parallel those in the blood. Kirkman has described an enzymatic method of estimating the erythrocyte phosphate with the same clinical use in mind (Kirkman 1960).

Long-term studies of galactosaemic children are being undertaken with psychometric and electro-encephalographic determinations. The EEG records in cases treated early are normal and the I.Q. levels are around 100 but seldom higher. Some of the children are restless and lack concentration but these are our older children, those investigated in detail and

who stayed longer in hospital. It is very difficult to assess how much this affected the infants and we must wait to see the progress of the younger children who spent only short times in hospital: so far their progress has been satisfactory.

Finally, we have been concerned about the possible ill effects of a lactose-free diet from birth although one knows that the normal and the galactosaemic individual can manufacture endogenous galactose. There is very little written on this point and certainly nothing indicating that lactose has a vital part to play.

Varma and Schwarz (1960) have carried out controlled feeding of kittens on comparable diets, one containing maltose and the other lactose. They sacrificed the kittens at varying times and examined the brains in some detail. They found the cerebroside contents to be similar and further work is now in progress.

APPENDIX

The recipe for Moll's pudding is as follows:

Ingredients: 6 oz. cereal; 3 oz. sugar; 2 eggs; 14 oz. water; pinch of salt; pinch of bicarbonate of soda; vegetable margarine up to one ounce.

Method: Mix the cereal well with the water. In this country cereals are sometimes fortified with milk powder and care must be taken not to use one of these for this formula. Separate the eggs and beat the sugar and egg yolks together thoroughly. Beat the whites with a pinch of salt and bicarbonate of soda until stiff. Mix all these ingredients together and place in a double boiler, the pan of which has been greased with vegetable margarine and dusted with dry cereal. Boil for 20–30 minutes.

To make up the feed one part of pudding should be added to four parts of boiled water or weak tea. These should be well mixed and strained before being put into the bottle.

SUMMARY

Galactosaemia is an inborn error of metabolism characterised by a specific inability to metabolise galactose in the normal manner. It is one of the first metabolic disorders in which the aetiology, the inheritance and the pathogenesis have been fully investigated.

The disorder is the result of an absence of the enzyme galactose-1-phosphate uridyl transferase, which is essential for the conversion of galactose-1-phosphate to glucose-1-phosphate.

There is an accumulation of galactose-1-phosphate in the erythrocytes, liver and kidney tissue, the brain and the lens with a resultant impairment of tissue metabolism. This produces the clinical picture seen in untreated cases.

The disorder is inherited as an autosomal recessive characteristic, the patient being homozygous for the gene. All siblings born into families where there have been cases of galactosaemia should be investigated at birth to identify the disorder when present at the earliest opportunity, for the rapid and complete exclusion of galactose from the diet of any proven case is considered to play an important part in determining future mental development.

The problem of mental retardation in cases of galactosaemia is discussed fully and the possible pathogenesis outlined. Details are given of a galactose-free diet.

RÉSUMÉ

La galactosémie est une maladie congénitale du métabolisme caractérisée par une incapacité spécifique à métaboliser normalement le galactose. C'est l'un des premiers troubles métaboliques dans lesquels l'étiologie, l'hérédité, la pathogénie ont été étudiées à fond.

Le trouble résulte de l'absence de l'enzyme galactose-1-phosphate uridyl transférase, essentiel à la conversion du galactose-1-phosphate en glucose-1-phosphate.

Il se produit une accumulation de galactose-1-phosphate dans les érythrocytes, le tissu du foie et des reins, le cerveau et le cristallin, entraînant une altération du métabolisme tissulaire. Ceci déclenche le tableau clinique observé dans les cas non traités.

Le trouble naît d'une caractéristique récessive autosomique, le malade étant homozygote pour ce gène. Les enfants d'une même fratrie, appartenant à des familles ayant eu des cas de galactosémie, devraient être examinés à la naissance afin que, si le trouble existe, il soit identifié dans les délais les plus propices, attendu que l'exclusion rapide et totale de galactose du régime, dans tout cas patant, passe pour jouer un rôle important dans la détermination du futur développement mental.

Le problème du retard mental dans les cas de galactosémie est discuté sous tous ses aspects et la pathogénie éventuelle esquissée. Enfin, des détails relatifs au régime sans galactose sont donnés.

ZUSAMMENFASSUNG

Galactosemia ist eine angeborene Störung des Stoffwechsels charakterisiert durch eine spezifische Unfähigkeit, Galaktose auf normale Weise zu metabolisieren. Es ist eine der ersten metabolischen Störungen in denen die Ätiologie, Erblichkeit und Pathogenie gründlich studiert wurden.

Die Störung kommt von der Abwesenheit der Enzyme Galaktose-1-phosphat uridyl Transferase, die wesentlich für die Verwandlung des Galaktose-1-phosphat in Glykose-1-phosphat ist.

Es entsteht eine Aufspeicherung von Galaktose-1-phosphat in den Erythrozyten, den Geweben der Leber und der Nieren, dem Gehirn und der Linse, die eine Störung des Gewebsmetabolismus zur Folge hat. So wird das klinische Bild, dass man in den unbehandelten Fällen beobachtet, erzeugt.

Die Störung ist ererbt wie eine autosomale rezessive Charakteristik, wobei der Patient homozygot für den Gen ist. Die Kinder derselben Geschwisterschaft, die Familien in denen es Fälle von Galactosemia gab, angehören, müssten gleich nach der Geburt untersucht werden, damit die Störung, wenn sie vorhanden ist, am günstigsten Zeitpunkt erkannt werde. Man nimmt nämlich an, dass schnelle und totale Ausschliessung von Galaktose aus der Diät in allen bestätigten Fällen einen wichtigen Anteil an der Bestimmung der zukünftigen geistigen Entwicklung hat.

Das Problem der geistigen Verspätung in Fällen von Galactosemia wird ausführlich besprochen und die mögliche Pathogenie wird rasch angedeutet. Einzelheiten über Galak tosefreie Diät werden gegeben.

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Assessment, Training and Employment of Adolescents and Young Adults with Cerebral Palsy

1. An Introductory Review

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MOST of the published work on the assessment and management of cerebral palsy has dealt with children, just as most of the medical, educational and social provision has been for cases of cerebral palsy in childhood. Increasing interest, however, is now been taken in older people with cerebral palsy. Plans for greater provision for their needs are being formulated, and the first follow-up studies and surveys have been published. This seems an opportune time to see how much is known, and to find the gaps in our knowledge, so that the studies so far completed may be used in further research and planning for cerebral palsied adults.

This review is concerned only with the vocational guidance, training and placement of adults with cerebral palsy, and not with the medical and social aspects. It does not do full justice to major studies such as those of Crothers and Paine (1959) in the U.S.A., Hansen (1960) in Denmark, and Holeran (1955) in this country.

Incidence and Prognosis

In children the incidence has been estimated at 1–2 per 1,000 children of school age (Dunsdon 1952). There are no firm figures for adults. A subcommittee formed to study the special welfare needs of cerebral palsied persons over 15 years of age, who would fall within the scope of Section 29 of the National Assistance Act, put the incidence in the region of 0.5 per 1,000 of the adult population. This would make about 17,000 cases in England and Wales (Ministry of Health 1953).

Of *mentally deficient* cerebral palsied patients of all ages, Kirman (1960) writes: 'The proportion of cerebral palsied cases in mental deficiency institutions will be less than 9.5 per cent of the whole, or some 6,000 in England and Wales—even less information is available about mental defectives under supervision and/or in hospital. It may be that there are some 7,000 further cases of cerebral palsy among mental defectives in the community, making a total of 13,000. Further elucidation is very necessary as this estimate is little better than guesswork.'

Life Expectancy—Crothers and Paine (1959) found a death-rate of 14 per cent among their sample of 847 cerebral palsied babies born in 1916–1955. They conclude that 'The majority of the cerebral palsied have a considerable life expectancy'.

Placement of Adults in Open Employment

Chailey (1959): Of a sample of 32 fairly severely handicapped school leavers with cerebral palsy born in 1939–1943, it was found that 9, or 28 per cent, were in open employment. One of these was articled to a chartered accountant and the rest were

doing unskilled or semi-skilled work. There were none with an I.Q. under 70 in open employment.

Leeds (1955): Of a sample of 78 young people over 15 years with cerebral palsy, born in 1932–1939 (including 15 excluded from school as ineducable but omitting 9 who could not be traced) 35, or 45 per cent, were in open employment. Of these, 20 were hemiplegics, 29 had left normal schools (therefore being presumably only slightly handicapped), 10 were doing clerical work, 6 were in distributive trades, 16 in skilled or semi-skilled work, 4 in unskilled work and 5 in open employment had I.Q.'s under 70 (8 were still at school).

Midlands (Ministry of Health, 1953, Appendix iii, Midlands Spastics Association): Of a sample of 385 young people over 15 years with cerebral palsy, there were 102 in normal work, 4 housewives, 28 still at school, and 12 in training. Appendix iv of this Ministry Circular gives details of the types of work undertaken by 98 people with cerebral palsy, and the nature and degree of their handicap.

Eastern Scotland (Mair 1960): Prof. A. Mair's important paper describes one section of a very complete investigation carried out in Eastern Scotland to ascertain the extent of cerebral palsy in a total population of 410,360 under 21. The whole investigation included medical, psychological, orthopaedic, blood-group, dental, and ear, nose and throat studies, with particular reference to hearing and speech. The survey revealed 240 cases accepted by the paediatrician as satisfying certain rigid diagnostic criteria of cerebral palsy, and this gave a prevalence of 2.04 per 1,000.

This paper is concerned with one aspect of the social side of the investigation—the opportunities for and success attained in obtaining and holding employment after leaving school. The data were collected by a social worker from 48 cerebral palsied young adults between the ages of 15 and 21, classified as mild, moderate or severe in terms of handicaps. This method of classification was applied to all the 240 cases of cerebral palsy studied. The method's great advantage is that, within the total investigation, studies relating to sub-samples, such as the present study, or to aspects of the whole investigation, such as Ross Mitchell's 'Medical aspects of a comprehensive survey of cerebral palsy' (this *Bulletin*, 1959, Vol. 1, No. 7, pp. 32–41), are strictly comparable in respect of classification. Its disadvantage is one that bedevils most of the published surveys of cerebral palsy: that, given a prevalence of 2 per 1,000, even regional surveys like this yield such small sub-groups that one wants to compare them with other surveys, and this is difficult because there is no common classification system. In fact, in the present survey one can compare the number of the 48 who were in employment with the number employed in other surveys, but one cannot draw any firm conclusions about the numbers employed in the mild, moderate and severe categories. The total number in open employment in this study is in fairly close agreement with the findings in the Leeds and Denmark surveys (see below) and therefore slightly higher than in most other surveys.

Professor Mair also makes an important point in his discussion of the difficulties inherent in comparative employment studies, when he writes 'perhaps a more realistic approach' (than reporting the number in employment) 'would be to classify spastics into those who are potentially employable and those who are not'.

Judging by the high quality of this article and that of the earlier one by Mitchell, and Miss Cockburn's papers on the psychological aspect of the survey, the publication of the whole investigation will be a major contribution to our knowledge of cerebral palsy. It is to be hoped that it will be published very soon.

America: (*a*) Crothers and Paine (1959), in their follow-up, found that 61 out of 138 adults with cerebral palsy (26 per cent) were in open employment.

(*b*) The same authors (*loc. cit.*) found that hemiplegics were the most frequently employed diagnostic group. Out of 94 adult hemiplegics, 27 were either working or employed as housewives. Their employment was comparable to that of unhandicapped people of comparable intelligence. Of 37 adults with extra-pyramidal cerebral palsy 14 were employed. Here factors other than I.Q. were relevant, and several were in jobs below their potential. None of 49 adult spastic tetraplegics were employed. None of 38 patients with mixed type cerebral palsy were employed.

Denmark (Hansen 1960): Of 1,127 patients over 15 years of age, 478 were employed (247), or housewives (51) or in training (175). Hansen therefore estimated that 35 per cent of cerebral palsied patients would manage socially and economically if 50 per cent of trainees were successful, and if the housewives were included in the economically and socially independent group. This is comparable with Dr. Haloran's figure (Leeds). Hansen says that the percentage is higher than that presented in most surveys because in his sample were patients with slight motor handicaps. He gives details of the type of work undertaken, and two very useful tables relating, among 245 patients:

(*a*) the disease type to employment;

(*b*) degree of motor handicap to employment.

(*a*) *Disease Type and Employment:* Like those of other workers, his figures show that cases of mono- or hemi-plegia are the most frequently employed, followed by paraplegics. The quadriplegics and athetoids have the poorest chances of employment.

(*b*) *Degree of Motor Handicap and Employment:* Hansen used 4 grades of motor handicap. He found that about 90 per cent of employed adults with cerebral palsy were grade I (slight motor handicap), but he points out that 10 per cent of cerebral palsied adults with moderate or moderate to severe motor handicaps were employed.

Comments: At best, 35–40 per cent of cerebral palsied adults are now in open employment. In some areas the figure is lower than this; therefore it seems that more cerebral palsied adults could be employed, given the conditions and procedure described in the surveys (such as Leeds) where the employment rate is highest. When low intelligence is associated with cerebral palsy, this is a further bar to employment, but in cases of athetosis and quadriplegia the physical condition seems to be the main bar.

The proportion of cerebral palsied adults who are in employment varies widely in different parts of the country. Leeds and the Midlands probably have the best figures because they have good services and a wide range of available employment. The Chailey figure of 28 per cent is based on a very small sample, but it may indicate the chances of employment in fairly severely handicapped cases of cerebral palsy. In Scotland (Coventry 1960), out of 180 'spastics' aged 16–45 years, referred because they were severe enough to merit special education and/or medical treatment, only 17 per cent were in open employment.

Vocational Guidance and Training

At Home. I have been unable to find any substantial results of vocational guidance or training published in this country, but there is a concensus of opinion that both are necessary. Specialist advice on employment seems to be fairly widely used—thus, at Chailey and Leeds all cerebral palsied school leavers are advised by a panel which includes doctors, teachers, social

workers and youth employment officers.

In Leeds, 4 'spastics' in open employment had been trained; at Chailey 4 are in training now; and in the Midlands there are 12 'spastics' in training. Of 65 adults with cerebral palsy who attended the Ministry of Labour's Industrial Rehabilitation Unit's courses, 5 began work after leaving the unit.

This may not give a representative picture of the general situation now. Out of 221 young adults with cerebral palsy referred to the N.S.S. Employment Officer, 69 have been accepted for training (Miss M. R. Morgan, personal communication).

Abroad. Hansen (1960) quotes Curtis's follow-up of 202 cerebral palsied adults who had received occupational advice and help from the department of vocational assistance of the United Cerebral Palsy Associations in New York in 1951–1953. Of these 52 were placed in a trade, advice was given to a further 111, and 35 could not be helped, mainly for psychological reasons. It is difficult to interpret these figures. What happened to the 111 who were advised? Hansen also quotes Bohne, who found that out of 158 patients considered suitable for training in social welfare institutions, only 46.8 per cent completed such a training, and only 16.4 per cent remained in the profession for which they were trained.

In Hansen's sample in Denmark, out of 1,127 'spastics', 175 were under training, 70 of whom were given training in handicraft. At least half of the 70 were unable to complete the training to a satisfactory degree. Private firms trained 83 patients for a trade; 25, or 30.1 per cent, did not complete training. In a Danish Voluntary Cripples Centre, 123 patients received trade training; 77, or 62.6 per cent, did not complete training. Therefore, 49.5 per cent have not completed training for the trade which they had begun. Purely commercial training was commenced by 30 patients, and only 6 did not complete this. Office training was take by 85 patients, and 17 were unable to complete this. Of the 27 who took a trade school training in association with office training, only 2 did not complete it. The reasons for the failure of these 19 was said to be a combination of feelings of inferiority, inability to concentrate and prolonged reaction time. Hansen says these three factors are frequently found in combination, and seem important in younger adult 'spastics'.

In summary, Hansen says that while more than half completed trade training, 80 per cent completed office training—but the criteria of selection for training for office work were higher than for trade training. Of those given professional training, 13 'spastics' were trained as schoolteachers, and 3 of them were unable to complete the course. Out of 11 who went to universities only 2 failed to complete the course.

Comments: The available figures now show a wastage in training of about 50 per cent. It may be that at present this large wastage is inevitable and must be accepted, and that this is the best we can do in the selection of candidates for training. However, the figure of 50 per cent may already be an overestimate because the new methods of training and guidance which have been introduced have not yet been evaluated.

More facilities for training and vocational advice are needed now, and both vocational advice and training could be improved by a study of existing methods. The efficiency of methods of training could be examined by comparing trained and untrained patients in the same occupation (Hansen 1960).

'Spastics' not in Open Employment

Chailey (total group 32): Of 23 not in open employment there are:

At home	7
In training or school	5
In sheltered work	8
In occupation centre of hospital	3

Leeds (total group 78): Of 42 not in open employment there are:

Notified to M.D. authority before age 15 (? present placement)	15
In mental hospital	2
In occupation centre	2
In sheltered workshop	1
Presumably at home (? unoccupied)	14
At school	8

Midlands (total group, aged 15 years and over, 385): Of 279 not in open employment there are:

At school	28
Under home teacher	6
In occupation centre	23
In training	12
In outwork	12
In sheltered workshop	10
In part-time work	4
At home	113
In M.D. institutions	41
In cripples homes	26
In hospitals	4

Of the 113 adult 'spastics' at home, 18 were said to be capable of work, 62 capable of handicrafts, and 33 totally incapable.

America: Of 726 cerebral palsied adults, Crothers and Paine (1959) found that 120 were in custodial institutions, representing 17 per cent of living 'spastics' of all ages. There were 14 'spastics' in short-term therapeutic institutions. Crothers and Paine do not give information on the placement or conditions of life of adults with cerebral palsy who were neither employed nor in institutions, except to say that 'many of the adult patients not "employed" in the proper sense of the word had occupations or hobbies which gave them pleasure and, in some cases, a small income . . . Patients worked out practicable occupations which would scarcely have occurred to the most resourceful physician or occupational therapist.'

Denmark: Of 1,127 'spastics' over the age of 15 years, Hansen (1960) found that 649, or more than half, were unemployed. Of these, 37 were estimated to require permanent residential care, and 9 to be suited for a residential home with training; 154 were said to be suitable for periodical stays at an occupational centre with earning periods; 154 required a sheltered workshop placement; 303 were fit to be dealt with as mental defectives; 144 were suitable for training for occupations; 68 required National Assistance and 'sideline' earnings. The actual number that Hansen estimated to need permanent residential care was small—37 out of 1,127.

Comments: We must expect at least 70 per cent of cerebral palsied adults to be unfit for open employment. We need more information about those who are at home, either apparently unoccupied or attending occupational centres or sheltered workshops. We need to know what services are available to them and their families. This aspect is mentioned by Mrs. Barnett in *Welfare Services and Social Problems of Young Adult Spastics* (1960). There certainly seems to be a need for more sheltered workshops, possibly those which include training. Hansen's graded scheme for the needs of cerebral palsied adults in Denmark seems an excellent basis on which to survey and then plan for their opposite numbers in this country.

Suggestions

I think these 5 things need to be done now:

(*a*) A survey of the incidence of adult cerebral palsy.

(*b*) A more careful analysis of available data on the present placement and condition of cerebral palsy adults, particularly those at home and presumably unoccupied, or in institutions.

(*c*) A study of the methods and results of existing services and centres.

(*d*) A study of job analysis and job placement now. This was suggested by the Sub-Committee on the Special Welfare Needs of Spastics in the Ministry of Health Circular 26/53. We need to revise our knowledge periodically of the placement of adult cerebral palsy patients, as there will be changes affecting this.

(*e*) Counselling or preparation of cerebral palsied schoolchildren and parents in readiness for adult life, particularly the severely handicapped, quadriplegics and athetoids who are unlikely to make open employment.

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SUMMARY

There are no firm figures for the prevalence of cerebral palsy in adults, but an approximate figure is 0.5 per 1,000 in the general population.

About 25 per cent of these adults with cerebral palsy are in open employment, but there are wide variations in the published figures, implying that different degrees of handicap are included in the different samples, and/or that there are considerable variations in the facilities and conditions of employment in different areas.

Monoplegics and hemiplegics are the types most frequently employed, followed by paraplegics. Quadriplegics and athetoids have the poorest chance of employment at present. When cerebral palsy is associated with low intelligence or other handicaps these constitute a further ban to employment.

There is little published evidence so far on the results of vocational guidance and training in this country. The American and Danish surveys indicate a large wastage in training (at least 50 per cent). This may now be unavoidable but suggests that new methods should be inquired into.

There is clearly a need for increased facilities for training and vocational advice.

Since about 70 per cent of adults with cerebral palsy are not in open employment, the following steps are suggested:

(1) A more careful analysis of available data on the present placement and conditions of cerebral palsied adults, particularly those living at home and presumably unoccupied.

(2) A study of the methods and results of existing services and centres.

(3) A study of job analysis and job placement now.

(4) More counselling or preparation of cerebral palsied schoolchildren and their parents, with special attention to the severely handicapped who are unlikely to obtain open employment.

RÉSUMÉ

Revue des études sur les encéphalopathes au-dessus de l'âge scolaire.

Il ne'existe pas de données certaines sur la fréquence de l'encéphalopathie chez les adultes, bien qu'on puisse admettre le taux de 0,5 per cent comme chiffre approximatif. Il y a probablement 1–2 per cent d'enfants encéphalopathes d'âge scolaire. Environ 10 per cent de ces enfants, déficients mentaux, sont placés en institutions.

La plupart des études sur les spastiques exerçant des emplois libres font penser que 25 per cent environ sont dans cette situation; cependant ce chiffre varie sensiblement soit

que des degrés de diminution essentiellement differentes sont compris dans les échantillons, soit qu'il existe, dans les différentes régions, des variations considérables dans l'accès et les conditions d'emploi.

Il paraît évident que les monoplégiques et les hémiplégiques sont le plus fréquemment employés, les paraplégiques venant ensuite. Les quadriplégiques et les athétoïdes ont les chances d'emploi les plus limitées. Une faible intelligence et d'autres handicaps associés à l'encéphalopathie viennent encore restreindre l'emploi de ces sujets.

Il existe pour le moment dans notre pays peu de données sur les résultats de l'orientation et de la formation professionnelles. L'étude de Hansen sur les études américaines et danoises indique un rebut important en cours de formation (au moins 50 per cent). Celà peut être actuellement inévitable mais suggère la nécessité d'évaluer les nouvelles méthodes non encore étudiées.

Il est clair que l'on doit donner plus de facilités pour la formation et l'orientation professionnelle.

Etant donné que 70 per cent d'encéphalopathes n'exercent pas d'emplois libres, les recommandations suivantes semblent s'imposer:

(1) Analyse plus poussée des données existant sur le placement et les conditions actuelles d'adultes encéphalopathes, surtout de ceux qui restent chez eux et qui très probablement ne travaillent pas;

(2) Étude des méthodes et des résultats des services et des centres existants;

(3) Étude portant sur l'analyse et l'attribution des tâches aujourd'hui en vigueur (étude proposée par le Sous-Comité sur les Besoins de Protection Spéciaux des Spastiques, Circulaire 26/53 du Ministère de la Santé).

(4) Davantage de conseils ou de préparation d'écoliers encéphalopathes et de leurs parents en vue de la vie adulte, surtout des enfants gravement atteints et qui ne pourront pas sans doute accéder aux emplois libres.

ZUSAMMENFASSUNG

Durchsicht der Studien ueber Patienten mit Zerebrallaehmung die das Schulater ueberschritten haben

Es gibt keine sicheren Angaben über die Verbreitung der Zerebrallähmung bei Erwachsenen, obgleich 0,5 prozent als annähernde Zahl gelten kann. Es gibt wahrscheinlich 1–2 prozent Kinder in Schulalter mit Zerebrallähmung. Ungefähr 10 prozent dieser Kinder befinden sich in Anstalten für geistig Beeinträchtigte.

Die meisten Studien über Spastiker die einen freien Beruf ausüben deuten an, dass es sich um ungefähr 25 prozent handelt aber diese Zahl ist sehr veränderlich, was darauf deutet, dass wesentlich verschiedene Beschränkungsgrade in den Proben einbegriffen sind, oder dass es in den verschiedenen Gegenden beträchtliche Unterschiede in den Anstellungsmöglichkeiten und-Bedingungen gibt.

Es scheint klar, dass Patienten mit Monoplegie und Hemiplegie am häufigsten angestellt werden, dann kommen Patienten mit Paraplegie. Patienten mi Quadriplegie oder Athetose haben die geringste Möglichkeit, eine Stellung zu bekommen. Wenn Schwachsinn oder andere Defekte mit Zerebrallähmung verbunden sind, bilden sie ein weiteres Hinernis für Anstellung.

Bis jetzt gibt es in unserem Lande wenig Angaben über die Ergebnisse der Berufsberatung und- Ausbildung. Hansens Uberblick über amerikanische und dänische Studien

zeigt einen grossen Abfall bei der Ausbildung (mindestens 50 prozent). Jetzt ist dieses vielleicht unvermeidlich aber es deutet an, dass es notwendig ist, die neuen, noch nicht studierten Methoden, abzuschätzen.

Es ist klar, dass vergrösserte Erleichterungen für Ausbildung und Berufsberatung nötig sind.

Da ungefähr 70 prozent der Patienten mit Zerebrallähmung keine offene Berufstätigkeit ausüben, scheinen folgende Empfehlungen angemessen:

(1) Eine sorgfältigere Analyse der vorhandenen Angaben über die Unterbringung und die jetzigen Lebensedingungen der Erwachsenen mit Zerebrallähmung, vor allem derer, die zu Hause bleiben und wahrscheinlich nicht arbeiten.

(2) Ein Studium der Methoden und Ergebnisse der vorhandenen Anstalten und Zentren.

(3) Ein Studium der Arbeitsanalyse und Arbeitszuteilung. Dieses wurde vom Unterkomität für spezielle Wohlfahrtsbedürfnisse der Spastiker im Zirkular 26/53 des Gesundheitsministeriums vorgeschlagen.

(4) Mehr Beratung oder Vorbereitung der Schulkinder mit Zerebrallähmung und ihrer Eltern für ihr Leben als Erwachsene vor allem der schwer befallenen Kinder, die wahrscheinlich keine offene Anstellung erreichen werden.

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Assessment, Training and Employment of Adolescents and Young Adults with Cerebral Palsy

2. What Facilities are Needed

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EVERY handicapped child, adolescent or adult deserves the best possible help, whether his or her handicap is of the body, the mind or the emotions, whether it is single, double or multiple. All handicapped people deserve to have the best bodily function that medicine can give them, the best intellectual achievement and satisfaction that education can give them, and the most satisfying human relationships and the best adaptation to his physical and social environment that he or she can hope to achieve. These ideal aims are far from being achieved by many non-handicapped members of our society; but it would be wrong to set a lower standard of attainment for the cerebral palsied than for oneself. In this article we shall consider some of the needs of the child with cerebral palsy when he leaves school.*

Full Assessment

Much of the present assessment of training for adults is based on rehabilitation methods, and is really only applicable to men and women who have become handicapped through an illness or accident after some years of employment. For the cerebral palsied, apart from a longer period being needed in which to assess the abilities of those whose handicaps mask their potentialities, a pattern of work has to be established. As Dr. C. D. S. Agassiz has said (*Cerebral Palsy Bulletin*, Vol. 1, No. 7, 1959): 'The term "rehabilitation" cannot rightly be applied to cases of cerebral palsy due to brain injury before or at birth, because these people have never been habilitated'.

Until quite recently, many people with cerebral palsy have been considered unsuitable for normal employment or even any employment at all, and where an occupation has been found for them it has really been merely diversionary, and they have been only too well aware that the products of their labours have little real value or use. This again fosters the impression that the handicapped man or woman is only a burden and cannot make any positive contribution to society, and it is not surprising that many of the more intelligent develop a serious grudge against life.

Cases of cerebral palsy need full assessment in the light of up-to-date knowledge. Each individual should be assessed not only on the basis of any obvious physical disability, but also in regard to:

1. Intellectual and educational status.

* Miss M. R. Morgan's article in this issue gives a very full account of the assessment, training and employment facilities now available.

2. Emotional stability.
3. Social qualities.
4. Special additional disabilities, such as:
   (*a*) Visual, sensory and perceptual.
   (*b*) Auditory, sensory and perceptual.
   (*c*) Speech.
   (*d*) Epilepsy and variants of epilepsy.
5. Special assets, such as:
   (*a*) Manual dexterity.
   (*b*) Concentration/distractibility.
   (*c*) Ability to persevere.

There is a very important group of brain damaged children whose physical damage is so comparatively minor that they can make the grade in a C stream or even a B stream of an ordinary school, and indeed get on quite well with all activities while they are in the school's sheltered environment, but run into difficulties when they are thrust out into the world of wider responsibilities. These children benefit from attending ordinary schools, particularly in regard to their social relationships; after they leave, in a competitive labour market they tend to get into difficulties. It is vital that this group should receive the early attention of the school medical officer and through him the attention of the Youth Employment Officer or a cerebral palsy society, or other specialist guidance, from an early age.

Apart from this group, there are three other groups of cerebral palsied adolescents who present very difficult problems of habilitation—the severely disabled case of cerebral palsy, the severely retarded, and the epileptic. Even after the full application of medical and social services, it may be impossible to fit these particular cases for employment in unprotected work; some might find work in Remploy factories or other sheltered workshops, but for many special provisions will have to be made.

Vocational Guidance

Vocational guidance is, or should be, very closely associated with a full assessment of handicaps and assets, and needs to be undertaken realistically, with frank and practical discussions, with both parents and children, by qualified people who understand the problems and know the labour position in the area. The major problem is often *not* the physical disability; nevertheless the parents may give medical measures priority over vocational treatment, which from a total viewpoint would be more therapeutic. Part of the assessment of the growing person must be vocational, and two quotations may be of interest here: (*a*) 'The decision (of his *educational* programme) may determine the child's vocational future'. (*b*) 'For the handicapped person, vocational guidance is very much an integral part of the wider problems of *emotional* adjustment'. (The italics are ours in each case.) In giving vocational guidance, it is well to consider both the intellectual and educational aspects, *and* the emotional and social ones.

There are arguments for making a preliminary assessment of the vocational possibilities before the adolescent leaves school. Where this can be done, it may be possible and useful to modify the curriculum for the last year or so at school. An alternative is to provide a further educational centre giving courses lasting 6–18 months, to be taken after leaving school. This new plan has the great advantage of avoiding a too early decision on the child's future. A 'social assessment' will include not only how the cerebral palsied person gets on with other people but also how others, especially strangers, are likely to react to him; the cerebral palsied person may have to be guided to appreciate that because drooling repels many strangers he must strive to control this unfortunate defect.

There is too often a gap between the educational programme and the advice and guidance on the child's future; a closer

liaison between the school staff and those dealing directly with training and employment seems essential. In particular, too many residential schools do not bother to pass current information on to the school medical officer of the young person's home area, so that he cannot get in touch with the Youth Employment Officer early enough. In theory, the residential school may get in touch with the Youth Employment Officer in the particular person's home area, but this technique is not commonly practised. Every residential school should make a point of keeping in close and direct touch with both the school medical officers and the Youth Employment Officer responsible for the school *and* in the child's own home area.

Trained Social Workers

Making a fully adequate assessment in all fields (medical, educational, psychological and social) almost always calls for the help of a trained social worker who has visited the adolescent or young adult in his home. The trained social worker can provide a most important link between all the services available for a young person with cerebral palsy. In addition to assisting in the assessment of a particular person, he or she can make sure that all available sources are being mobilised. Apart from checking that the particular boy or girl with cerebral palsy is in contact with local authorities who may be assisting them to find employment, the trained social worker visiting the home can ensure that appliances, aids and apparatus helpful for living (for the bath, toilet, feeding, writing and moving about) have been made available. In this country the trained social worker may be provided from the National Health Service hospital or psychiatric clinic, by the school medical service or otherwise from the local authority or by voluntary societies and agencies. There is, however, a shortage of trained social workers and a demand for them in many important fields.

Training Facilities

Even while the child or adolescent is at school, decisions on what he is to learn or do may affect the vocations that will be possible for him later. Handicrafts learnt for the purpose of acquiring manual dexterity have little vocational significance for future employment. Many of those who train workers, whether in factories or in a training centre, want trainees who have had a good general education. It may be unwise to give a child specific technical training for several years at school.

As a generalisation, the cerebral palsied person's chief handicap is his slowness. Training may partly obviate this; an alternative approach which probably has much to offer is the use of machinery, so that the operator only has to initiate the procedure.

In general the types of training undertaken at Government rehabilitation centres are unsuitable for cases of cerebral palsy, since they mostly require a good use of one or both hands. The syllabuses are rigidly laid down and the time schedules are usually too tight for the cerebral palsied. Many could complete part of the course or could reach a reasonable standard if the course was extended, but Ministry of Labour regulations usually do not permit this and training often has to be terminated before it is completed. On the other hand, people with cerebral palsy derive much benefit from mixing with people who have other disabilities and should do so whenever possible.

Employment

When a cerebral palsied child leaves school, which for the handicapped is usually at the age of 16, or has completed training, a job is usually found for him by the local Youth Employment Officer, or for those over 18 years by the Disablement

Resettlement Officer. Parents may find work for their cerebral palsied children, but concealment of the handicap is not always to the ultimate benefit of the handicapped person, and the Disablement Resettlement Officer can often arrange special facilities which might not otherwise be allowed. The National Spastics Society Employment Department, which has been running since October 1957, appears to fill a very real need for specialist advice, judging by the number of people who have been referred to the department since its inception. It has been of undoubted use to Youth Employment Officers, Disablement Resettlement Officers, Welfare Officers and others dealing with the handicapped.

An officer has recently been appointed to this department specifically to assist the boys and girls leaving school. She works in close liaison with both schools and Youth Employment Officers, and will, we hope, co-ordinate the advice and guidance given to these young people.

SUMMARY

This article, which is intended to supplement Miss Morgan's account of the facilities now available for cerebral palsied adolescents and adults, discusses some of the problems which remain unsolved for these people after they leave school. It is by no means a full account of these problems, but it may stimulate more thought about, and ultimately better facilities for, the adolescent with cerebral palsy.

RÉSUMÉ

Cet article, destiné à complèter le compte rendu de Miss Morgan sur les facilités dont dispose actuellement le spastique, a amorcé des discussions sur certains problèmes non encore résolus pour lui, une fois qu'il a quitté l'école. Il ne faut nullement y voir un compte rendu complet de ces problèmes. Nous espérons simplement qu'il servira à faire penser davantage à l'adolescent infirme moteur cérébral et à lui apporter, par la suite, de plus grandes facilités.

ZUSAMMENFASSUNG

In diesem Artikel, der den Bericht von Miss Morgan über die Erleichterungen über die jetzt der Spastiker verfucht ergänzen soll, wird versucht einige Probleme für die der Spastiker noch keine Lösung gefunden hat wenn er die Schule verlässt, zu erörtern. Man darf darin nicht einen vollstärdigen Bericht über diese Probleme sehen. Wir hoffe nnur, dass er dazu dienen wird, dass man mehr an den Jugendlichen mit Zerebrallähmung denkt und ihm später grössere Erleichterungen bringt.

Assessment, Training and Employment of Adolescents and Young Adults with Cerebral Palsy

3. Facilities Now Available

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A GREAT deal has been and is being done in both the medical and educational fields for children with cerebral palsy, and now our thoughts are turning towards the problem of integrating the school leaver into the adult world. Many of the older people with cerebral palsy today are living unsatisfactory and unsatisfied lives, and are misfits in society, because they were not adequately advised and prepared in adolescence. Many school leavers have normal, if often unrealistic, ambitions for their future, and they soon become disillusioned and frustrated if these ambitions cannot be realised and they are left at home month after month with nothing to do. Others need stimulation and encouragement, without which they soon become indolent and unwilling to contribute towards society.

In this article, I am considering what services are already available or are planned for the near future. There are, unfortunately, both gaps and overlapping in the services provided for handicapped young people over school age, and too often parents and advisers are unaware of what is available or to whom they should apply for help.

Assessment and Vocational Guidance

In view of the diversity of the handicaps, assessment must necessarily be a long-term process in many cases, if we are to treat our young people fairly. At present facilities are offered at the industrial rehabilitation units run by the Ministry of Labour in different parts of the country, at medical centres which are usually under the control of the Regional Hospital Boards, at industrial recuperative centres, and at other similar units.

It is obviously advisable to make preliminary assessments while the adolescents are still at school, so that their curricula in the final years can, if necessary, be modified to suit their particular needs. Much valuable medical, educational, emotional and social information is accumulated during the child's school years, and it is most important to co-ordinate this information so that a full appraisal can be made of the problem that each child presents before he or she leaves school. The normal procedure now is for the school medical officer to complete a medical report form at the leaver inspection indicating whether the child has a handicap which would make him unsuitable for certain employments, and, in addition, for the headmaster to report on the child's educational progress. In practice, these forms are usually completed early in the child's last year at school and sent to the Youth Employment Officer some months before the child leaves the school; where the child has suffered for a substantial time from more than a minor handicap the school medical officer commonly gets in touch direct with the Youth Employment Officer or other special services long before the child reaches school-leaving age. However,

the immaturity of many children with cerebral palsy often makes it difficult to determine their potentialities at this age, and many continue to develop for several years after leaving school.

The 1–3-day assessment given at industrial rehabilitation units can only be the merest guide and does not really do justice to most young people with cerebral palsy, many of whom are unlikely to have begun to settle down in that short period. Even the maximum period of 12 weeks is sometimes insufficient, since a girl or boy who has just left school is often at least 2–3 years retarded emotionally and socially, and no special provisions are made in the residential centres for social activities. At the medical rehabilitation centres the emphasis is on therapy, and, though the young people often benefit considerably from a stay at one of these centres, it is not always easy to make a definite recommendation about employment at the end of the course.

The National Spastics Society's Employment Department has been running 12-day residential courses for young people between the ages of sixteen and twenty-five years, in order to give them the opportunity to mix with others of their own age away from home, and also to give the staff of the Employment Department a longer time in which to observe them, and to consider possibilities for their future. The programme is carefully designed to stimulate group discussions on a variety of subjects, to give a better appreciation of what work involves, and to visit factories to see working conditions. Practical tests have been devised to supply a guide to each student's manual dexterity, concentration, ability to follow instructions, speed, and other factors. A number of varied social activities are also included, and an assessment is made of the student's social attitudes, these being an integral part of their acceptance in and adjustment to adult life.

To meet the particular needs of the immature school leaver, the National Spastics Society is planning to open a further educational centre for school leavers, with courses lasting 6–12 months or even longer, to help bridge the gap between school leaving and adulthood and to avoid making too early decisions. Both educational and practical work will be included in the courses and, in addition to various aspects of social training, the young people will be tried in a variety of jobs likely to be most suitable to handicapped people. The Society is at present running an experimental 6-months' course for a group of eighteen school leavers at one of the holiday homes. It will be interesting to follow the results of this course.

The Youth Employment Officer is responsible for co-ordinating all the activities aimed at finding a place for cerebral palsied people in a community. The Youth Employment Departments, which in most areas are part of the Local Education Department, offer vocational guidance services to all school leavers and young people up to the age of 18 years. Most Youth Employment Officers deal with unhandicapped children as well as handicapped ones, though there seems to be a growing awareness of the fact that special guidance is necessary for handicapped children, and in some districts a special Youth Employment Officer has been appointed to deal with these children.

So far as the adults are concerned, the Disablement Resettlement Service of the Ministry of Labour offers advice on training and employment. Anyone who is substantially handicapped can apply for registration as a disabled person, and can call on the services of the Disablement Resettlement Officer who helps to find suitable jobs for applicants by contacting firms or making arrangements for assessment and training.

The National Spastics Society Employment Department, established in October 1957, and staffed by trained social workers with industrial and commercial experience, offers an advisory and placement service both to school leavers and to adults, and arranges to interview 'spastics' either in their own homes or in the local Youth Employment Office or Ministry of Labour Employment Exchange.

Training

Government Training Centres, run by the Ministry of Labour, provide training for unhandicapped as well as handicapped people. Training is usually to a skilled standard in various trades, and generally speaking the educational and physical requirements for entry are too high for many cases of cerebral palsy. Several training centres run by voluntary societies, in conjunction with the education authorities and the Ministry of Labour, have, however, been in operation for some years, and many 'spastics' have been through their hands with varying degrees of success.

The National Spastics Society Training Centre, at Sherrards, Welwyn, Hertfordshire, has now been running for just over 4 years, and forty-eight young people have been trained and placed in normal employment. A great deal has been learnt about the training of the cerebrally palsied during this period, and from the experiences gained it appears that light engineering and, in particular, simple repetitive work is one of the best types of training for many of our young people. Trainees seem to make better progress when they are with other young people like themselves, and when they are under the guidance of specially trained staff. Although the training may take a considerable time and progress may be very slow, many of the trainees eventually achieve a reasonable standard of work. This is the only centre which provides exclusively for 'spastics', and it is sponsored by the Ministry of Labour who provide grants for the trainees. Candidates are all submitted through the Ministry of Labour to the National Spastics Society Employment Department, and are generally considered by the Ministry to be suitable for sheltered employment only. In placing forty-eight of the trainees, the Society has proved that, with special training, many of the more severely handicapped can hold their own in competitive employment.

In addition to training in practical work, many of our young people need social training to make them acceptable both in their employment and in adult life outside work. Many need to gain confidence in using public transport, doing their own shopping and planning their budgets, and this side of the training is an integral part of the Sherrards course.

Special grants for further training or part-time courses can sometimes be arranged through the local education department or the Ministry of Labour, although it is not always easy to find places for 'spastics' in the normal technical and evening institutes. The classes are generally rather large, and students with cerebral palsy need more individual attention than is available and often cannot keep pace with the syllabuses.

Some firms are prepared to train handicapped people in the factory, on the office floor, or in their own training units, and in special cases grants can be obtained from the Ministry of Labour. This outlet for training should certainly be developed, and needs much more investigation and encouragement. A start has been made by a London company manufacturing overprinting machines, who offer to train handicapped young people, free of charge, and also help to place them in jobs after training.

Employment

Youth Employment Officers and Disable-

ment Resettlement Officers offer a job-placement service to implement the vocational guidance. Either the young people themselves or their parents sometimes find jobs, and when this is done through personal contact it may work out well. It is not always a satisfactory method, however, for employers need to be prepared for the interview, and when the difficulties are explained to them they often arrange special facilities. Again, the National Spastics Society Employment Department can often help by approaching firms and arranging interviews; well over 300 more severely handicapped 'spastics' have so far been found employment in this way.

The Society's Industrial Liaison Officer, who is himself a 'spastic', travels all over the country, speaking at meetings of business-men, industrialists, rotary clubs and Ministry of Labour advisory committees, explaining cerebral palsy and talking to employers from his own experience about the types of work that can be done and the problems that may be encountered. During the past three years, he has created a much wider knowledge of, and interest in, the employment of 'spastics', and has been encouraged by the ready response of many employers, although there is still a widespread ignorance of the complications of the handicap.

The statutory authorities are glad of this specialised assistance, and the staff of the Employment Department always work in conjunction with the local Disablement Resettlement Officer or Youth Employment Officer, when trying to find a job for a young person with cerebral palsy.

Special Work

For various reasons, however, many 'spastics' are unable to manage normal employment and must be found work under sheltered conditions. Throughout the country there are 90 Remploy factories which cater for all types of handicapped people. Some of these factories do employ a very small number of 'spastics', but in fact a multiple handicap like cerebral palsy seems too complex for their type of work. There are a number of other sheltered workshops in different parts of the country, run by voluntary organisations, catering either for all types of handicap or for one specific disability. These centres vary greatly, and range from non-residential sheltered work where a reasonable standard of production is required and near-normal wages are paid, to residential centres for the much more severely handicapped, where occupational therapy and craft work are provided. Some of these workshops also provide training, but it is preferable to separate training from sheltered employment since the two activities are not really compatible.

The National Spastics Society is building a factory in the Midlands to employ 120 'spastics' in sheltered conditions. This unit will be organised on a proper industrial basis, using industrial machinery and equipment, adapted where necessary to suit the particular requirements of the handicapped. A hostel is also being built in close proximity to the factory, so that employees can be drawn from all over the country. It is hoped that employees will earn wages comparable to those paid in Remploy factories. Applications can be made through the Ministry of Labour, or the National Spastics Society's Employment Department.

In many of the other centres for the severely handicapped much greater emphasis is now being placed on organised employment than occupational therapy; in many of them regular hours of work are maintained and the residents are paid either a fixed amount or a price for the goods that are sold. Although some 'spastics' are provided for in this way, there are very few suitable openings for

adolescents and much of the work is craft or handwork requiring good manual dexterity. The residents are usually wholly or partly sponsored by the local welfare authorities, and the responsibility for them is often accepted only if the arrangements for care at home are unsuitable or inadequate.

Again, the National Spastics Society has recognised the need for additional provision of this type, and is planning to open a work centre with hostel accommodation for both the younger 'spastics' who are not ready for training or sheltered employment, and also for the older, more severely handicapped man or woman who cannot be accommodated at home but who can make some contribution to a production unit.

The National Spastics Society has three residential centres for the very severely handicapped—Prested Hall, Essex, for older men and women; Coombe Farm, Croydon, for adolescents; and Daresbury Hall, near Warrington, for men aged 16–35. Applications for these centres are made to the Society through the Senior Social Worker. There are long waiting-lists for all residential centres, and since there is very little turnover there will be an increasing need for this type of provision, where the residents can lead happy and useful lives and learn to join and be accepted in the social life of the neighbourhood.

Local Day Centres

There is no need for many of our young people to live away from home permanently, if some useful occupation can be found for them locally. In some areas provision is made, or is being planned, by the local welfare authorities for occupational centres (or 'pastime' centres), which can be attended either on one or two days a week or on a full-time basis. The trend is to concentrate more on industrial and less on craft work in these centres, though many still have a long way to go. Again, attendance for one or two days a week is insufficient for most young 'spastics' who have often led full and active lives at school and need useful occupation all day and every day. Some local groups of the National Spastics Society have become aware of this need, and several are already running work centres on either a full-time or part-time basis for the adolescents and adults in their area. Some are undertaking subcontract work for local firms, others are doing simple printing or craft work, and all have been recommended to create conditions as near to normal working life as possible. Transport is always a problem, though the young people should be encouraged to use either public transport or their own vehicles wherever possible. The improvement in the morale of the young people attending these centres on a full-time basis has been most marked, and this type of provision can undoubtedly fill a very great need.

Home-Work

In some less populated areas it is impractical to transport the young people to a centre, and a few county welfare authorities provide domiciliary occupational therapists to visit their homes and instruct them in various types of craft work. In many cases such visits cannot be made very frequently, and without constant pressure the home-work often remains uncompleted. The supply of industrial work is very problematical and it can only be provided in industrial areas where other facilities are usually available. The National Spastics Society Employment Department maintains a display of work done by home-workers, arranges exhibitions, sells work and takes orders, but much more needs to be done in this field by local people who can visit regularly, advise on the work, and encourage sales.

SUMMARY

When a child with cerebral palsy leaves school, it is usual for a completely new set of people to take over responsibility for the boy or girl, and there is no clear-cut guidance about spheres of responsibility or the local authority or department who can best offer advice.

Parents and advisers are often unaware of what is available in different parts of the country or to whom to apply for guidance and help.

An attempt has here been made to indicate what facilities are now available for assessment, vocational guidance, training, employment (open and sheltered), residential centres, and home-work.

RÉSUMÉ

L'adolescent et l'adulte infirmes moteurs cérébraux.

Lorsqu'un enfant atteint d'infirmité motrice cérébrale quitte l'école, un groupe de personnes totalement nouveau assume d'habitude la responsabilité de ce jeune; or il n'existe rien qui puisse nettement les guider sur l'étendue de leurs responsabilités ou sur les autorités qui, à l'échelon local ou départemental, sont les plus aptes à être consultées.

Parents et conseillers ignorent souvent les facilités dont ils disposent dans différentes parties du pays et ne savent à qui demander conseil ou aide.

Nous avons essayé d'indiquer quelles facilités s'offraient actuellement à eux en ce qui concerne l'évaluation des capacités, l'orientation professionnelle, la formation, l'emploi (libre ou protégé) et le travail à domicile.

ZUSAMMENFASSUNG

Der Jugendliche und der Erwachsene mit Zerebrallähmung.

Wenn ein an Zerebrallähmung leidendes Kind die Schule verlässt, übernimmt gewöhnlich eine ganz neue Gruppe von Personen die Verantwortung dieses jungen Menschen; nun gibt es aber keine ganz klare Führung in betreff ihres Verantwortungs kreises oder der lokalen oder Bezirksautoritäten die am fähigsten sind, sie zu beraten.

Eltern und Erzieher wissen oft nicht, was ihnen in den verschiedenen Teilen des Landes zur Verfügung steht und an wen sie sich wenden müssen, um Rat oder Hilfe zu bekommen.

In diesem Artikel hat man versucht zu zeigen, welche Erleichterungen sich jetzt im Bereiche der Abschätzung der Fähigkeiten, der Berufsberatung, der Ausbildung, der Anstellung (frei oder geschützt) und der Heimarbeit darbieten.

The Assessment of Hearing in Young Cerebral Palsied Children

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TESTING the hearing of cerebral palsied children of school age is not easy but can be done comparatively quickly. With children under 5 years the difficulties are much greater and it is often not possible to apply formal tests. In these cases it is necessary to carry out a series of observations which may continue over a considerable period.

Early detection of a hearing loss long before the age of 5 years is of great importance for speech and language development, but it is precisely during this period that the difficulties of finding out about the child's hearing are greatest.

This paper reports the results of an investigation whose purpose was to find out what were the practical difficulties, and what time was required to arrive at a final conclusion about the hearing of these children.

Material

Systematic examinations of hearing of all children who attended the Centre for Spastic Children started in 1956 and regular weekly sessions of testing and observation were instituted. Since then this has become an integral part of the work of the Centre, and the principle was adopted that all children who were admitted should have their hearing fully assessed, whether deafness was suspected or not. This is important because in cerebral palsied children suspicions of deafness on a symptomatic basis are unreliable since the same symptoms—for example, an articulation defect, or absence of speech—may be caused either by deafness or by the physical disability, or both causes simultaneously.

From February 1956 to October 1958 a total of 76 children were tested.

The age-distribution (at the time when hearing tests were instituted) was:

Under 2 years	4	4–5 years	28
2–3 years	5	5–7 years	25
3–4 years	14		

The types of cerebral palsy were:

Spastic	38	Rigidity	4
Athetoid	19	Mixed	9
Ataxic	6		

The distribution of various grades of mental ability, so far as it was possible to assess this up to the date when the investigation ended, presented this picture:

Above average (I.Q. 110 +)	3
Average (I.Q. 90–110)	27
Dull (I.Q. 70–90)	24
Very low (I.Q. 50–69)	13
Deficiency level	8
Not assessed	1

It will be noted that this is not a representative sample of the cerebral palsied population as a whole. The figures merely show the type of children referred to the Centre. A group of children between the ages of 5 and 7 years was included in the study and this makes our results somewhat better than they would be without this group. Because this is not a strict statistical

investigation but a study of methods and difficulties, and because we wanted to present the results of hearing tests in all children who attended the Centre in a certain period, we decided to include this age-group.

Hearing Tests in Physically Normal Children

There are two conditions, so far as the child is concerned, which decide what method of testing can be applied. The first is when the child can co-operate actively and give a voluntary signal that the test sound was heard. The second is when no active co-operation is forthcoming, so that formal testing is not possible. The dividing line, in mentally and physically normal children, is roughly at the age of 2½ years. From this age the child can be taught to perform a certain act in a play situation when the test sound is produced. When the child is performing reliably the intensity at which the sound was heard is estimated. The next stage is a full audiometric test, which gives the best picture about the physiological condition of the hearing apparatus. This is a more difficult procedure for the child because it is a threshold test and the child is required to

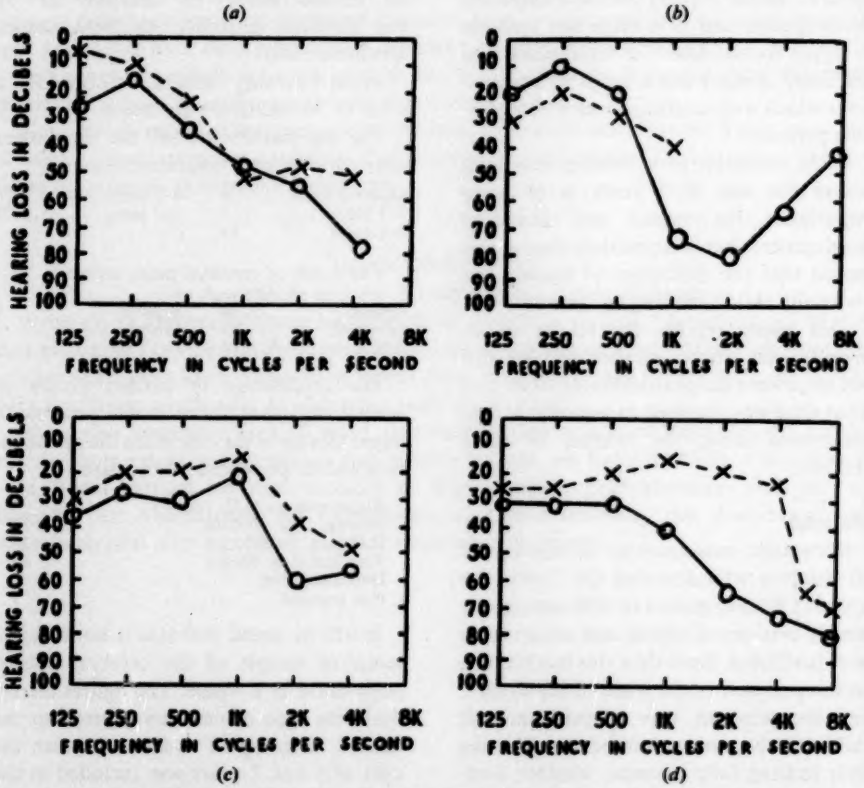

Fig. 1. Pure tone audiograms in 4 cases of bilateral perceptive deafness of moderate to moderately severe degree. Sessions required to complete testing:
(*a*) Spastic quadriplegia—7. (*b*) Athetoid—2. (*c*) Athetoid—2. (*d*) Asymmetrical spastic quadriplegia—5.

respond at just audible intensities. It is also difficult because the sounds are pure notes —that is, meaningless sounds—and the child does not respond as readily to these as to the more interesting sounds used in other tests. In mentally normal children it is possible to obtain, as a routine, a reliable response at threshold from the age of 3½ years, and in many cases before that age.

When no active co-operation is forthcoming, one must resort to a careful observation of the child's reactions to sound stimulation. This is not so precise as the method previously mentioned, but it is not a completely uncontrolled situation. If certain procedures and rules are observed, the result can answer these two questions: Is the child severely deaf? Is the child moderately deaf? Or one can conclude that the child's hearing is not impaired to such an extent as to cause significant delay in understanding and learning to speak.

Test Sounds. A variety of sounds are used so as to cover a wide range of frequencies. These are indicated on a special chart, which is used for recording purposes. A few haphazardly selected sound sources are not sufficient. Although a child reacts to one or two sounds he may yet be part deaf. He may hear low notes normally but high-frequency sounds not at all (Figs. 1 and 2).

Reactions to Test Sounds. The reactions

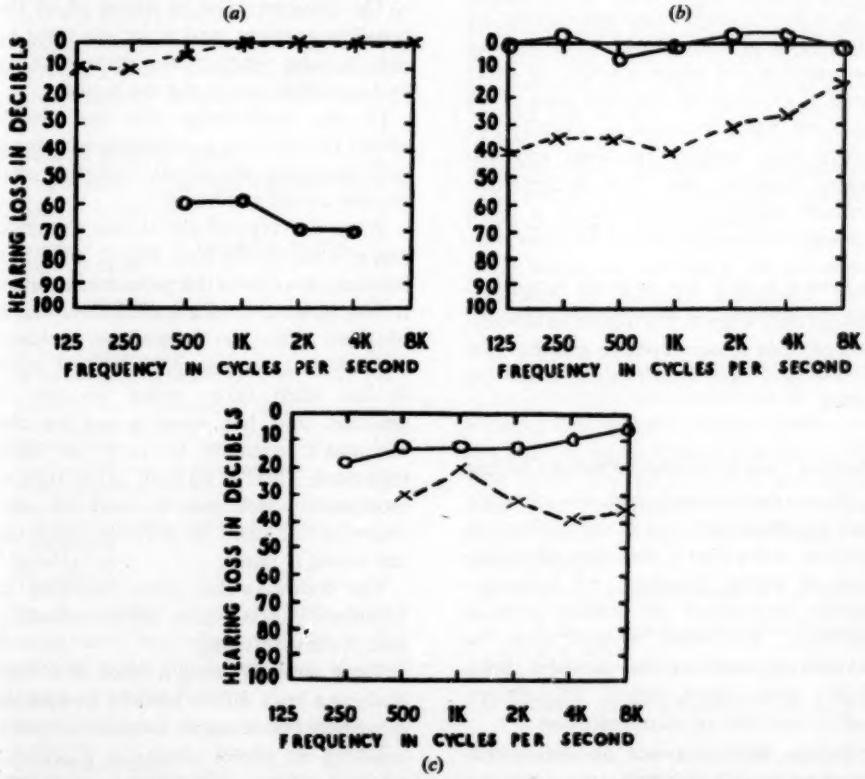

Fig. 2. Pure tone audiograms in 3 cases of unilateral deafness: (*a*) Spastic hemiplegia, hemispherectomy —5 Sessions (with much practice between them). (*b*) Ataxic—1. (*c*) Athetoid—3.

which one may expect from a physically normal child are turning the head, ceasing momentarily whatever activity the child may be engaged in, crying or suddenly ceasing to cry, blinking, changes in facial expression and adopting a listening attitude, or some other motor reaction, including the Moro reflex.

An experienced observer watches and reports on the reactions observed. After several observations have been recorded on different occasions, a full picture of the child's ability to hear finally emerges.

It is essential in *all* hearing tests to observe certain rules and avoid some pitfalls. One must ensure, for example, that the child is not reacting to visual stimulation or to vibration. Misinterpretations are likely to occur when these tests are applied by inexperienced observers. On the other hand, to experienced observers some of the reactions are unmistakable. Initially, we record only positive reactions and disregard negative ones. This is important because *absence of reactions to a sound stimulus in a small child does not necessarily mean that the sound was not heard.* However, consistent absence of reactions, though only when this is related to stimulation of other sensory systems and the child as a whole, may finally prove a hearing defect.

Hearing Tests in Cerebral Palsied Children

The cerebral palsied child, when hearing tests are attempted, may present difficulties peculiar to this type of disability. Modifications of testing procedures are necessary, mainly because of the child's physical disability, but other aspects must be considered, such as the cerebral palsy child's great distractibility, fatiguability, and incapability of sustained effort.

During the test based on observation one must bear in mind that the child may not be able, physically, to react to the stimulus. For these reasons preliminary knowledge of the child's abilities is essential, and here the physiotherapist's advice may be very useful. One must first find out what type of reaction is possible. A sound is produced which the child most probably hears—for example, a low note of moderately high intensity—or a reaction is elicited by other types of sensory stimulation. A child with very poor head control will be unable to turn his head in the direction of the sound source, but by careful observation it may be noted that his eyes move in that direction, or he may attempt to turn his whole body, or a muscular contraction may be *felt* when a small child sits on an assistant's lap.

The observer must be aware of all the possible reactions, and he or she must be able to judge whether the response was in fact a reliable one to the test sound.

In the *conditioning test* the child's ability to carry out a voluntary movement will determine the signal indicating that the test sound was heard.

When the type of signal that the child can give has finally been found, it is often necessary to practise this procedure between testing sessions until a reliable response is obtained. This has been done in many cases by the speech therapists at the Centre. It has often taken many sessions of practice, and has been a tax on the therapist's ingenuity to keep the child interested. There is no limit to the type of movement which can be used for conditioning the child to perform when the test sound is heard.

The following list gives examples of voluntary efforts which were successfully used for conditioning:

Using hands: Placing a brick in a box; pushing a brick off the table by a sweeping movement (when unable to hold the brick); touching an object placed in a suitable position; releasing an object (a small ball) placed in the hand, into a conveniently

placed box; pushing a toy roundabout; raising the arm; banging a drum.

Using feet (when there was no voluntary control of any sort in hands or arms): Kicking a small ball off a suitably placed low table; pushing a brick or a ball off the table by a sweeping movement; picking up small beakers by the toes; raising the leg; stamping the floor.

Using head or body: Nodding; opening and closing mouth; pushing head or body against back of chair (a toy squeaker can be placed between head and back of chair, and the child can be trained to squeeze it when the test sound is produced).

Using speech sounds (owing to the frequent involvement of the speech mechanism this is not always possible): Saying 'yes' or a similar sound, or any type of babbling or grunting sound the child can produce, can occasionally be used for conditioning.

Results of Hearing Tests

The results of the hearing tests were as follows:

Normal hearing, or significant hearing loss excluded	57
Significant hearing loss	19
TOTAL TESTED	76
Methods of Testing	
Full audiometric test	32
By observation of behaviour	44
Results of the 32 audiometric tests	
Normal audiograph	20
Hearing loss	12
Results of 44 tests by observation	
Perfectly normal hearing	8
Significant hearing loss excluded although perfectly normal hearing could not be confirmed	27
Hearing loss	7
Untestable	2

In the group of 12 children whose hearing loss was confirmed by a full audiometric test the distribution of types of deafness was as follows:

Bilateral moderate to severe perceptive deafness	4
Unilateral deafness	3
Minor degrees of conductive deafness	5

The results of the audiometric tests are shown in Figs. 1 and 2 (the 5 cases of conductive deafness are not included).

In the 7 children whose hearing loss was discovered by other than audiometric methods the findings were:

Moderate to severe deafness	3
Loss of hearing for higher notes	1
Slight hearing loss	3

Concerning the 27 children (of the group tested by observation only) whose hearing could not be confirmed as perfectly normal, but in whom a significant hearing loss could be safely excluded, the following comment is necessary. The main purpose of tests by observation of behaviour is to exclude hearing loss which could produce difficulties in communication by speech, but in these cases minor hearing losses often cannot be excluded, as can be done by pure-tone threshold audiometry. We were satisfied that there was no child whose hearing loss of any significance remained undetected, and all the children whose deafness was discovered undoubtedly benefited from the appropriate measures taken as a result of the testing.

Number of Sessions and Time Required to Complete Assessment of Hearing by any Test

One of the objects of this investigation was to obtain information about the actual working time related to testing procedures, and what could be done to shorten it. The time factor plays an important part in the assessment programme of the cerebral palsied child, particularly in regard to hearing ability.

In 30 children complete assessment was made in 1 to 2 sessions.
In 21 children complete assessment was made in 3 to 4 sessions.
In 11 children complete assessment was made in 5 to 6 sessions.
In 4 children complete assessment was made in 7 to 8 sessions.

Two children were untestable, and in 2 early cases no reliable record was available concerning the number of sessions required.

The 6 remaining cases each required more than 8 sessions.

The number of sessions was not strictly related to the period over which they were spread. For different reasons the sessions required were spread over widely variable periods. For example, in some cases it has taken 4 months to complete four sessions, but in one case the records show that the same number of formal sessions of observation or testing was spread over 12 months, and in one case over 14 months. The longest time it has taken to observe and test a child before a final conclusion could be made was 28 months, in two cases 22 to 23 months, in eight cases 11–15 months, in six cases 7–9 months, and in five cases 2–4 months.

This analysis shows, first, that in 30 out of 76 cases, in face of considerable difficulties, it was possible to conclude the examination in no more than two formal sessions of testing or observation. On the other hand, in 32 cases it has taken us 3–6 sessions to arrive at a final conclusion, and in many cases it has taken many more sessions or months to complete the assessment.

The number of formal sessions is not so significant as the time required to complete them. As has been mentioned, a great deal of practice in the testing procedure (conditioning the child) was done between individual formal sessions. For example, a child who required three sessions spread over 4 months was difficult to condition at the first session. Between the first and second sessions 3 weeks elapsed during which the speech therapist regularly practised the procedure required for conditioning. In other cases, mainly in young children, initial observations did not suggest a significant hearing loss, and therefore during the time available more attention was devoted to urgent cases. However, the fact that in many cases assessment has taken 4–28 months (in 19 children) reflects the real difficulties involved in testing.

Number of Sessions Required for Testing, related to Mental Ability

Among the serious factors causing long delays were, first, mental ability, secondly the children's age, and thirdly the degree of their physical disability. As expected, these were the most important factors affecting the time necessary for final assessment. However, even in the mental deficiency group fairly good assessments of hearing were achieved.

A more detailed analysis of our figures may interest those who are planning an assessment programme for cerebral palsied children, and will illustrate the effort and time required for a satisfactory programme of this kind.

Children of Mental Deficiency Level (*I.Q. below* 50). Of the 8 children in this group, 1 was assessed as deaf (by free field testing), and 2 were untestable. In the rest no significant hearing loss was found, but of course some hearing loss could not be excluded. However, it was certain that their difficulties were not caused or significantly aggravated by deafness.

In none of these children was an audiometric test possible.
In 1 (deaf) child 8 sessions were required.
In 1 (deaf) child 5 sessions were required.
In 3 (deaf) children 2 sessions were required.
In 3 (deaf) children 1 session was required.

(*Children of Very Low Mental Ability* (*I.Q.* 50–69). Of the 13 in this group, 1 child was assessed as having a high frequency hearing loss.

In 2 cases an audiometric test was accomplished.
In 1 child 8 sessions were required.
In 2 children 4 sessions were required.
In 4 children 3 sessions were required.
In 2 children 2 sessions were required.
In 4 children 1 session was required.

Dull Children (*I.Q.* 70–90). Of the 24 children 8 showed some hearing loss.

In 11 cases an audiometric test was completed.
In 4 children 1 session was required.

In 10 children 2–3 sessions were required.
In 8 children 4–5 sessions were required.
In 2 children 6 sessions were required.

Average Group (*I.Q.* 90–110). Of the 27 children, 8 showed some hearing loss.

In 16 cases an audiometric test was completed.
In 8 children 1 session was required.
In 8 children 2 sessions were required.
In 5 children 3–4 sessions were required.
In 3 children 5–6 sessions were required.
In 2 children 7 sessions were required.
In one early case no reliable record was available.

Above-average Group (*I.Q.* 110 *plus*). Of the 3 children, 1 showed some hearing loss.

In all the 3 cases an audiometric test was completed.
In 1 case 1 session was required.
In 1 case 2 sessions were required.
In 1 case 3 sessions were required.

This analysis shows that the children's innate mental abilities are directly related to the possibility of testing by full audiometry, but it also shows that low mental ability *alone* is not entirely responsible for the longer period necessary for full assessment. It is interesting to see, for example, that in the mental deficient group there were 3 children whose assessment could be completed in a single session. Occasionally these children produce spontaneous and brisk reactions to all test sounds almost automatically. Even the usual process of habituation does not function normally, and therefore this particular type of child may be easier to test than a child of higher intelligence.

Ability for Audiometric Testing

Age-range Related to Completion of Audiogram. There is no need for an analysis to prove that the age of the child is closely related to the possibility of carrying out a reliable audiometric test. For recording purposes, and also to show that audiometric tests were possible at a comparatively early age, in spite of the great difficulties peculiar to cerebral palsied children, we quote these figures:

Of the total of 76 children, no audiogram was possible in those below the age of 3 years (9 children in this group).
Of the 14 children aged 3–4 years, an audiometric test was completed in 5.
Of the 28 children aged 4–5 years, an audiometric test was completed in 13.
Of the 25 children aged 5 years or over, an audiometric test was completed in 14.

Ability to Complete Audiogram Related to Physical Handicap. Children who completed audiograms in one or two sessions were always only slightly or moderately handicapped physically. Only one child with a severe handicap was able to complete an audiogram in one session, and in this case high intelligence and a very co-operative personality greatly compensated for the physical defect. Children who took a comparatively large number of sessions to complete an audiogram were on the whole, but not always, the most severely handicapped physically. The ones who took longest of all to test were almost always the children with a dual handicap of low mental ability and severe physical handicap.

Time Taken to Complete Reliable Audiometric Tests (*an Overall Picture*). Of the 32 audiograms completed:

In 11 cases it took not longer than 1 month.
2 cases it took not longer than 2 months.
3 cases it took not longer than 3 months.
1 case it took not longer than 5 months.
1 case it took not longer than 6 months.
3 cases it took not longer than 7 months.
1 case it took not longer than 8 months.
6 cases it took not longer than 11–15 months.
4 cases it took not longer than 24–27 months.

This shows that in more than a third of the cases testing did not take more than 2 months. On the other hand, in 8 cases testing has taken between 11 and 27 months. These were children with severe physical difficulties, and their audiometric tests often had to be done piecemeal in many stages.

Audiometry

Pure-tone audiometry gives the best picture of the *physiological* condition of the hearing apparatus. Hearing for speech

should also be tested but this is often not possible with small cerebral palsied children. 'Free field' tests (without earphones) can be influenced considerably by acoustic conditions. The child's constant uncontrolled movements may create many noises around him, some of which contain a considerable element of 'white noise' which can easily mask high-frequency sounds of smaller intensity.

According to our experience, an audiogram, particularly in cerebral palsied children, gives the most reliable picture of the child's hearing ability, and is the best *single* hearing test for detecting a hearing loss in these children. The interpretation of audiograms should not be divorced from the full clinical picture. The significance of an audiogram will be apparent only when related to the child's general abilities or disabilities.

As our results show, audiometry in *small* cerebral children can be a long and laborious task. In spite of this, in 13 cases it has taken us no longer than two months to complete these tests. This can be achieved only with the assistance of a highly skilled and trained staff.

Duration of Audiometric Tests and Suggested Improvements

So far as we know, only one detailed study has been done on the actual working time for the audiometric testing of small children with normal hearing (Lowell *et al.* 1956). Excluding the time taken to become acquainted with the child, and occasional breaks, it was found that the preliminary conditioning in free field (without earphones) averaged 3.8 minutes, the transfer to the audiometer 5.4 minutes, and the determination of six thresholds (three frequencies in each ear) took 23 minutes, or a total working time of slightly over half an hour. This is roughly in agreement with the experiences at another audiology clinic where large numbers of small children are examined (M. Drummond and J. Quinn, personal communication). A full threshold test for *all* frequencies, in both ears, can often be done in the same time. With children who have a hearing loss initial conditioning is more difficult and may take longer, but after this has been achieved the determination of thresholds does not take longer than in the normally hearing child.

These observations are useful when one considers the working time to carry out these tests in cerebral palsied children. Our observations have shown that in most small cerebral palsied children one cannot expect to complete the test in one session, although in our series this was achieved in 5 out of 32 audiometric tests.

The difficulties mentioned necessarily prolong the test, often to many times the half-hour required for normal children.

Improvements in Audiometry

In the light of our experiences the audiometric procedure *can* be improved. The following suggestions are made:

1. Often practice is necessary to train the child in the testing procedure (practice audiometry) between formal sessions of testing. When an audiometric result was achieved in comparatively few sessions this was possible because of such practice. If there is special urgency to complete the assessment, short sessions of daily practice are desirable. Long gaps must be avoided.

2. We found that delay, sometimes costing two sessions, was caused when attempts were made to transfer from conditioning in free field to audiometry, because the child was apprehensive when the earphones were put on his head. In such a case, as a transitional stage, it is advisable to use a small earphone which we evolved for this purpose. This has no attached wires and can be held in the hand. It has a transistorised oscillator incorporated, including a small cell battery.

Pressure on a spring produces a note of moderate intensity. Usually the child does not object to this small earphone, which can be held first near his ear, and then gradually pressed on his auricle. The earphone of the audiometer will then be more acceptable.

3. Before full audiometry is carried out one can use a small transistorised audiometer in free field, calibrated at a certain distance from the ear, and practise the reliability of response for pure notes (Denes and Reed 1959).

4. Various simple mechanical devices can be constructed to ease the response in more severely handicapped children. These can be various push or pull devices, which are easy to use by a single uncomplicated movement.

5. The testing room should be fairly large. It is important to have enough space for the child to be put in a comfortable position, if necessary lying on a soft carpet. Some children can give a voluntary signal better in this position. There should be at least 15 feet between the child and the sound source in free-field testing.

6. A special table for the conditioning play is essential. This should be covered with foam rubber to ensure maximum quietness. A ledge on the side furthest away from the child is advisable to prevent toys falling on the floor, and some kind of container should be fixed at each end to catch the bricks or balls as the child pushes or sweeps them away.

7. A small low table, adjustable in height, should be available for aiding the utilisation of a foot or leg response during conditioning.

8. A wide variety of *soft* plastic or polythene toys should be available.

RECORD OF HEARING TEST IN FREE FIELD

Name _____ Date _____

Test Sound	Distance	Intensity (recorded sounds)	Type of Reaction
Rattle Tissue paper Cup and spoon Bell Squeaker Castanet Music box Mouth organ Drum Unvoiced consonants Voice			
Xylophone 250 c/s 500 1000 2000 4000			
Pitch pipe 250 500 1000 2000 4000			
Free field 500 Audiometer 1000 2000 4000			
Tuning 125 fork 256 512 1000 2000 3000 4000			
Monochord			
Localized sound source : Yes No Remarks:			

Fig. 3. Form for recording free-field hearing tests (half scale).

Noisy hard toys distract the child an destroy the quiet atmosphere essential for accurate testing.

9. For tests which require the child's active co-operation in giving a voluntary response to the sound stimulus, it is important to hold the child's attention and interest long enough for the determination of threshold. The younger the child, the more difficult it becomes to hold his attention. With cerebral palsied children this may be even more difficult. The well-known distractibility of these children calls for greater efforts in interesting them in the test. It is particularly important to eliminate background stimulation as far as possible. The duration of a particular activity will vary greatly from child to child, and the tester's skill will have to be exercised to present new activities as soon as the child's attention is waning. This of course applies to all forms of testing, both audiometry and observation in free field.

Free-field Testing and Suggested Improvements

The test sounds now used in free field are not very satisfactory. They lack variety, and it is difficult to gauge their intensity. According to our experience it is desirable to have a great variety of sounds available, including many meaningful sounds which cannot always be produced at will in the testing room. These include a variety of domestic sounds, musical and speech sounds, ringing bells, noise of cars, running water, and animal noises (Fig. 3).

The smaller the choice of sounds available, the longer the observations may take. One reason is the natural process of habituation to a sound. In some children this may occur rapidly after one or two stimulations with a test sound. There may be one reaction and no more, and it is then necessary to use a different sound. A time lapse, sometimes until the next session, is necessary in order to use the same sound and estimate at what intensity the child heard it. In other words, the smaller the variety of test sounds, the longer it takes to estimate the child's hearing fully.

To overcome this important difficulty, it would be highly desirable to have *a sound reproducing system* (Fig. 4), consisting of a

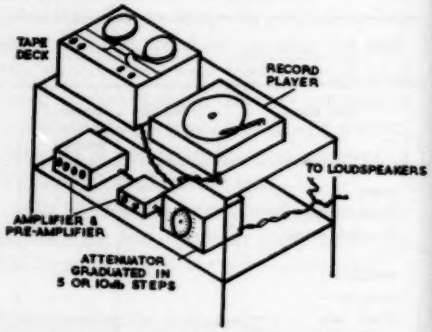

Fig. 4. Sound-reproducing apparatus, with tape and record players, for free-field testing.

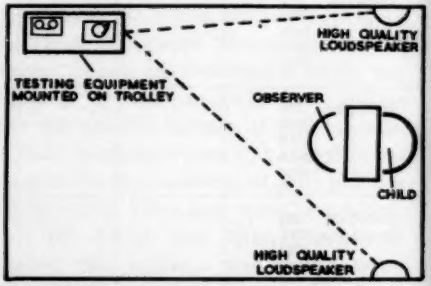

Fig. 5. Arrangement of apparatus for free-field testing.

tape player and a record player, which would deliver sound through a high-fidelity amplifying system, with an attenuator graduated in 5 or 10 decibel places. There should be a fixed distance between the child and the loud-speaker.

This type of system has many advantages;

it saves time because more accurate information is gained at each session, and a greater number of responses are obtained with the wider variety of sounds. The apparatus should be built so that when the money is available two speakers can be used in different corners of the room, thus increasing the advantages of the whole system. The principle requirements of this apparatus are illustrated in Fig. 5.

SUMMARY

The methods of testing the hearing in small cerebral palsied children are reviewed. Various difficulties are described, and how to overcome them.

Observations were made concerning the amount of time and number of sessions required for the various testing procedures in different types of children.

It was found that although in many cases a few sessions of observation over a period of few weeks were sufficient, in many other children months were necessary before final conclusions could be drawn as to the ability to hear.

Low mental ability and the degree of physical handicap were the two most important factors influencing the length of period required for full assessment.

Practical suggestions are made concerning greater economy and time spent in carrying out these tests.

Hearing loss in cerebral palsied children is difficult to detect because the same symptoms may be caused either by deafness, by physical disability or by both together. All the children should therefore be tested, whether deafness is suspected or not. At the Centre for Spastic Children, Chelsea, routine observations and tests of hearing are done on all children. In this way hearing defects are discovered at a much earlier age, although the procedures are frequently laborious. Systematic observations on the ability to hear should start as soon as possible and should be part of the assessment or rehabilitation programme of the cerebral palsied child.

RÉSUMÉ

Appreciation de l'audition chez le jeune enfant infirme moteur cerebral.

Revue des méthodes utilisées pour mesurer l'audition chez les jeunes infirmes moteurs cérébraux. Suit une description des diverses difficultés relatives à ces mesures et de la façon d'y remédier. Les observations ont porté sur le temps et le nombre des séances nécessaires à l'application des diverses méthodes de mesure sur différents types d'enfants.

On a constaté que si dans bien des cas il ne fallait pas plus de quelques séances en quelques semaines, il fallait chez bien d'autres enfants des mois avant de pouvoir se prononcer définitivement sur leur capacité d'audition.

Une faible capacité mentale et le degré de l'infirmité physique ont été les deux plus importants facteurs agissant sur la durée de la période d'élaboration du diagnostic définitif.

Plusieurs suggestions d'ordre pratique sont proposées pour réaliser une économie plus marquée et abréger la période d'examen.

La perte de l'audition est difficilement décelable chez les enfants infirmes moteurs cérébraux; les mêmes phénomènes peuvent être attribués aussi bien à la surdité qu'à l'infirmité ou aux deux. Tous les enfants, susceptibles de surdité ou non, doivent être examinés. Au Centre des Enfants spastiques de Chelsea, on soumet systématiquement et régulièrement tous les enfants à des examens et à des mesures de l'audition. Ainsi, un trouble de l'audition a pu être mis en évidence à un age particulièrement précoce malgré la difficulté des procédés souvent fort laborieux.

Des examens systématiques de la capacité d'audition doivent être entrepris le plus tôt possible et doivent être compris dans un programme d'appréciation et de réadaptation de l'enfant infirme moteur cérébral.

ZUSAMMENFASSUNG

Die Pruefung des Hoervermoegens bei jungen Kindern mit Zerebrallaehmung.

Dieser Artikel gibt einen Uberblick über die Methoden für die Abschätzung des Hörvermögens der kleinen Kinder mit Zerebrallähmung. Man beschreibt die verschie denen Schwierigkeiten, die mit diesen Methoden verbunden sind und die Mittel, um sie zu beseitigen.

Die Beobachtungen betragen die Dauer und die Anzahl der Sitzungen, die für die verschiedenen Testverfahren mit verschiedenen Kindertypen nötig sind.

Man hat gefunden dass, wenn in vielen Fällen nicht mehr als einige Sitzungen während einiger Wochen genügten, man bei vielen anderen Kindern Monate brauchte, um einen entgültigen Schluss über ihre Hörfähigkeit ziehen zu können. Schwache geistige Fähigkeiten und der Grad des körperlichen Gebrechens waren die zwei Hauptfaktoren, die einen Einfluss auf die Dauer der für eine genaue Abschätzung nötigen Periode ausgeübt haben.

Mehrere praktische Massnahmen hinsichtlich besserer Ersparung und Verkürzung der Untersuchungszeit, werden vorgeschlagen.

Gehörverlust ist bei Kindern mit Zerebrallähmung schwer zu entdecken, denn dieselben Symptome können sogut durch die Schwerhörigkeit als auch durch das körperliche Gebrechen verursacht sein. Alle Kinder, ob man Taubheit vermute oder nicht, müssen untersucht werden.

In der Anstalt von Chelsea für spastische Kinder werden regelmässige und systematische Untersuchungen und Prüfungen des Hörvermögens alle Kinder durchgeführt. So konnte ein Gehördefekt in sehr frühem Alter entdeckt werden, obgleich die Verfahren sich oft sehr mühsam erwiesen.

Systematische Untersuchungen des Hörvermögens müssen so früh als möglich unter— nommen, und einem Abschätzungs—und Readaptierungs-programm für das Kind mit Zerebrallähmung eingegliedert werden.

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Social Status of the Parents of Cerebral Palsied Children

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THERE have been several papers on the social status of parents of mentally subnormal children, but there has been a conspicuous absence of work on the social status of parents of children with cerebral palsy, an omission mentioned by Woods (1957) in her book concerning children with cerebral palsy in the Bristol region. In view of the similarities in many respects between the known aetiological factors for mental subnormality and cerebral palsy, we resolved to study the social status of the parents of children with cerebral palsy.

The study was carried out in Bristol and Sheffield, and comprises 417 children.

We have taken care to ensure that there have been no avoidable omissions in the study. The Bristol School Health Department refers all children with cerebral palsy to the assessment clinic at the Children's Hospital. The psychologist to this clinic is also the Chief Education Psychologist to the Bristol Education Committee, and he would hear of any child which had not gone through the assessment clinic. In addition there is close liaison between the assessment clinic and the Bristol Mental Health Officer, and all affected children in the local Mental Deficiency Hospitals are known to the clinic. In Sheffield we have included all affected children attending the Children's Hospital and the City General Hospital, and have ensured that we have included all children known to the Local Health Authority, including the School Medical Service. We were unable to

SOCIAL GRADING OF PARENTS OF BRISTOL AND SHEFFIELD GROUPS OF CHILDREN WITH CEREBRAL PALSY

Social Class	*BRISTOL* *Total* 284			*SHEFFIELD* *Total* 133		
	No.	*Per Cent*	*Normal distribution (per cent)*	*No.*	*Per Cent*	*Normal distribution (per cent)*
I	8	3	3	4	3.0	2.5
II	49	17	14	8	6.0	11.6
III	144	51	55	79	59.4	56.1
IV	36	12.5	12	11	8.2	13.2
V	47	16.5	15.5	31	23.3	16.6

include 4 Sheffield children because they were adopted and we could not trace their real parents, and 3 other affected children could not be traced. Otherwise we are satisfied that our numbers are complete and that all affected children have been included in the study.

The age of the affected cases at the time of the study ranged from a few weeks to 20 years.

The Registrar General's 'social class' grading was used in all cases. With the exception of 4 families in Sheffield, the social grading which we used was that of the work the father was doing at the time of the child's birth.

Results

It will be seen from the table that in both the areas studied the social grading of the parents of affected children corresponded very closely to that of the general population in these areas. In Bristol 20 per cent of the parents of affected children were in social class I and II, compared with 17 per cent in the general population; 29 per cent were in social class IV and V, compared with 27.5 per cent in the general population. In Sheffield 9 per cent of the parents were in social class I and II (compared with 14.1 per cent in the general population), and 31.5 per cent in class IV and V (compared with 29.8 per cent in the normal population). It is clear that these differences are not significant.

Acknowledgements: Our thanks are due to Miss E. H. L. Duncan, statistician to the Bristol Local Authority, for her help, and Dr. A. K. Black, Senior Maternity and Child Welfare Officer, Sheffield, and to Miss Littlewood, Superintendent Health Visitor, Sheffield, and to all the Health Visitors who obtained the data concerning parental occupation in the Sheffield area. We also wish to thank Dr. T. Colver for permission to investigate the social status of the parents of children under his care.

SUMMARY

We have studied the social status of parents of children with cerebral palsy in Bristol and Sheffield. There was no significant difference from the normal distribution of the social classes in those regions.

RÉSUMÉ

Statut social des parents d'enfants atteints de paralysie cerebrale

Nous avons étudié le groupement social des parents d'enfants atteints de paralysie cérébrale à Bristol et à Sheffield. Il n'a été trouvé aucune différence significative avec la répartition normale des groupes sociaux dans ces régions.

ZUSAMMENFASSUNG

Soziales Statut der Kinder mit Zerebrallaehmung

Wir haben die soziale Zusammenstellung der Eltern der Kinder mit Zerebrallähmung in Bristol und Sheffield untersucht. Es wurde kein bedeutsamer Unterschied mit der normalen Verteilung der sozialen Gruppen in diesen Gegenden gefunden.

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The Soviet or Psychoprophylactic Method of Painless Childbirth

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THIS paper is chiefly concerned with the Soviet or psychoprophylactic method of painless childbirth, but it also includes a short account of other methods of psychosomatic childbirth and a critical survey of the subject as a whole. My own experience of the Soviet method was gained chiefly at the late Dr. Lamaze's maternity clinic in Paris, but apart from minor differences, which will be stated, this is a faithful reproduction of the Soviet method which was confirmed during a visit to Moscow in October, 1959.

The psychoprophylactic method of childbirth may be defined as a painless labour without recourse to analgesic drugs, the mother remaining co-operative throughout, thanks to careful antenatal preparation, both physical and mental.

The use of analgesic drugs in labour is a more significant factor in the cause of asphyxia neonatorum than is generally realised, Schreiber (1938) finding apnoea seven times less common in a normal spontaneous birth without the use of analgesics. The importance of this will be realised when it is recalled that asphyxia neonatorum is the second commonest single factor in the aetiology of cerebral birth palsy, accounting for 23 per cent, according to Bobath (1956).

The advantages to the mother and child are manifold; fear and apprehension are replaced by confidence, so that all stages of labour are shortened and the actual delivery is a happy experience.

Conversely, the use of analgesics and anaesthetics in childbirth carries definite risks to both the mother and the child. The duration of labour is increased, the incidence of operative deliveries rises, nausea and vomiting are common, and the mother tends to be unco-operative, especially during delivery—all factors in the causation of foetal anoxia.

It is therefore obvious that a method of childbirth where analgesics are rarely required is of outstanding merit in the fields of obstetrics and paediatrics.

It has long been recognised that primitive woman is less liable to suffering than her more civilised sister, and this is remarked on by Dr. Alice Stockham (1883) in her book, *Tokology*, the first chapter of which is entitled 'Painless Childbirth'. She was of the opinion that the sufferings of modern women arose through faulty upbringing, and that much could be done to rectify this by antenatal relaxation exercises, simple explanations on the physiology of labour and the allaying of fear. However, it is to Grantly Dick Read that credit must go for evolving a method of childbirth which is relatively painless without the use of drugs. In his *Natural Childbirth* (1933) he postulated the theory

that fear, by stimulating the sympathetic autonomic nervous system, caused incoordination of uterine muscle; hence the aphorism, 'tight mind, tight cervix'.

It is not difficult to understand why fear is so much associated in the mind of civilised woman with childbirth, for from an early age she learns that pain is the constant handmaid of pregnancy and parturition. From the Bible she learns that 'women will bring forth their children in sorrow', and from her elders that women may die in childbirth and that her newborn child may be deformed. When she herself is pregnant, well-meaning relatives and neighbours will describe with relish the terrible times they have experienced.

It follows that removal of this fear will be associated with elimination of the pain and it was the pioneer work of Grantly Dick Read which showed how this could be achieved. By gaining the patient's confidence, fear could be banished, and this was attained by the teaching of voluntary muscle relaxation, which is accompanied, *pari passu*, by mental relaxation. Simple lectures on the physiology of pregnancy and labour, with explanations of why uterine contractions may be painful, and how this may be prevented, are combined with the teaching of relaxation. Too much seems to depend on the operator's personality, and certainly Dick Read's method is open to criticism on the grounds of empiricism.

Hypnotism

The earliest attempts to relieve the pain of childbirth without recourse to drugs used hypnotism, Gerlin in Berlin and Lafontaine in Switzerland reporting its use for this purpose in 1840 and 1863 respectively. However, hypnotism is uncertain as a therapeutic agent, for even when it is possible to reach the deeper stages rapport between the parturient and operator may be lost, and subsequent control is then difficult or impossible.

When hypnosis was discussed at a meeting of the Obstetrics Section of the Royal Society of Medicine in February, 1960, one of the speakers, S. D. Perchard, presented his results from its use in childbirth. All the patients were primigravidae volunteers and a good response to attempted hypnosis was obtained in over 50 per cent (somnambules probably 10–12 per cent), with under 25 per cent failures. For most obstetric purposes deep hypnosis was not considered essential.

The 1,380 primigravidae who volunteered for special antenatal classes were prepared as follows. In *Group A*, the 268 patients were given 3 lectures only; in *Group B*, the 126 patients were given 3 lectures plus 3 relaxation classes; and in *Group C*, the 986 patients were given 3 lectures plus 3 sessions of hypnotic suggestion.

The main objective result was the reduced need for sedation in Group C. As regards subjective results, there were highly significant differences in favour of Group C in respect to: (1) subsequent recollection of severe pain; (2) subsequent recollection of labour as a pleasant experience; and (3) the patient's evaluation of her preparation as a great help.

The Psychoprophylactic Method

The Soviet method of painless childbirth is based on Pavlovian physiology and considers the pain of parturition to be in the nature of a conditioned reflex. They postulate that cortical influence is the necessary intermediary of all external stimuli and that all vegetative processes must be submitted to the intervention of the cerebral cortex.

On this concept a Soviet team, notably Platonov, Velvosky and Nicolaiev (1951) produced a method which will reduce or prevent the pain of childbirth; essentially this method is one of activating the

cerebral cortex to inhibit collateral reactions, of which the principal is pain. By suppressing certain conditioned reflexes through antenatal education, a peripheral defence reaction which ends in pain is prevented.

In 1951 the Government of the U.S.S.R. decreed that the psychoprophylactic method should be applied in every maternity unit throughout the country, provided the presentation was normal. This is one of the few respects in which Dr. Lamaze differs from the Soviet procedure, in that he applies the method irrespective of the presentation.

Outside the Soviet Union little was known of the psychoprophylactic method until March 1952, when Dr. Lamaze introduced it into his maternity unit in Paris. He had practised orthodox obstetrics until 1951, when on a visit to the U.S.S.R. he witnessed the practical application of the psychoprophylactic method at the maternity unit of Professor Nicolaiev in Leningrad. So excellent were the results that he was determined to introduce a similar system on his return to France. Following the adoption of the Soviet method he found his results paralleled those he had witnessed in the U.S.S.R., and these were so good that his more orthodox colleagues viewed them with suspicion. Dr. Lamaze's claim of painless childbirth, having a direct appeal to most women, gained considerable publicity in the lay press, by the radio and the televising of an actual delivery. Naturally his claim aroused considerable controversy, so much so that in March 1953 the Minister of Public Health in Paris decreed that an independent objective enquiry should be set up.

This consisted of the introduction of the Soviet method into several Parisian municipal hospitals, the results obtained being pooled and reported to the Minister of Health and the French Academy of Medicine (Mayer 1954). I was also sceptical of the claims of Dr. Lamaze and his team, but a visit to the clinic seemed necessary before one could dismiss a method of childbirth which, if justified, would be of inestimable value in the practice of obstetrics. Accordingly, in 1955, through the generosity of the Ciba Foundation and the unfailing help and courtesy of my French colleagues, Dr. Lamaze and Professor Mayer, I spent 4 weeks in Paris studying painless childbirth at Dr. Lamaze's maternity unit, the Maternité du Metallurgiste, and at the Hôpital St. Antoine, one of the hospitals chosen to participate in the enquiry set up by the Minister of Public Health. A full report of this investigation has already been published (McNeil 1955), and only a summary of the relevant points are therefore given here.

Maternité du Metallurgiste

To an obstetrician or paediatrician, a visit to Dr. Lamaze's clinic is an unforgettable experience and provides convincing proof of the success of his project and the claims made on its behalf.

The maternity unit is part of a polyclinic situated in a working-class district of Paris. Arranged on two floors, the unit is modern in design, with the labour rooms above the lying-in wards, and the department as a whole is well lighted and pleasantly decorated. The woman in labour is admitted straight to one of the single-bedded soundproof labour rooms where she has a trained attendant with her throughout labour. The attendant revises the antenatal exercises and helps the patient to relax both physically and mentally.

Staff: Every help and courtesy is accorded to the visitor, and one cannot but be impressed by the enthusiasm of the medical and nursing staff. The nursing staff comprise both permanent staff and midwives undergoing training in the particular methods of the clinic. They seem to

be drawn from a better social class than the nurses usually found in French hospitals, but apparently this is common to all privately owned establishments in France.

Course of Instruction: This is intended to instruct doctors in the theory and practice of painless childbirth, and those attending come from as far afield as the U.S.A. and China, as well as most European countries. The course, which lasts a week, includes attendance at the antenatal classes, lectures on the theoretical aspects of the subject, and opportunities to observe actual deliveries. In his opening address, Dr. Lamaze briefly outlines the purpose of the clinic, its work and results. After this there is a very full programme, which fills the mornings and afternoons for the whole week.

Antenatal Preparation of Patients: In addition to the usual antenatal examinations, the patients are required to attend a series of lecture demonstrations, starting with an introductory talk given by a doctor at the end of the third month of pregnancy. There are lectures on the physiology of pregnancy from the Pavlovian point of view, and antenatal training classes in charge of a psychotherapist. These lectures and those on the mechanics of labour are fully illustrated with models and drawings. Between classes there is ample opportunity for discussion and questions. A further 8 lectures are given in the last two months of pregnancy. All members of the staff take part in these, including physiotherapists and psychotherapists who teach progressive relaxation, explaining in Pavlovian terms the genesis of pain and how it can be overcome. There are opportunities for the expectant mother to discuss any particular problem in private if she wants to. The final lecture, which should take place not more than ten days before the expected date of delivery, includes the showing of a film on painless childbirth. Finally, the patients are taken round the labour rooms and maternity wards, where they are encouraged to talk to the women already delivered and find out how highly they value their training.

The clinics are small, not more than 15 patients being present at each. They usually include multiparae as well as primigravidae, and there may be one or two multiparae who have had their previous confinements under Dr. Lamaze, and whose enthusiasm for the method encourages the others. The sincerity of the teachers and their complete faith in painless childbirth is apparent to all, and the patients are soon imbued with this faith.

Labour and Delivery: Early in labour (to 5 cm. dilatation of cervix) the patient is encouraged to move about and talk to the others or listen to the radio, breathing rapidly and shallowly with each contraction, as she was taught during the antenatal period.

5–8 *cm. Dilatation:* When the contractions are strongly established the woman should be at rest, so that she can give her whole attention to the conduct of her labour; lying in a comfortable bed, with her shoulders and head supported by pillows and her legs flexed, she controls the contractions by rapid shallow respirations.

8–10 *cm. Dilatation:* Since this is the most difficult phase of labour to control, it is essential for a trained attendant to be present to give the patient active encouragement. At this stage the woman goes to the delivery room, walking there if possible. Her position in bed is similar to that for the 5–8 cm. stage, but with the shoulders supported at a higher level and the feet lower than the buttocks.

Oxygen: This used to be administered with a funnel but is now given with a small mask, from the end of the first stage of labour. During the expulsive stage, the patient now takes a deep breath of oxygen at the onset of a contraction, and, holding her breath, bears down in full inspiration.

During the delivery her attendant tells her what is happening, and there is no interference with the delivery of the head until it is crowned. Then the patient is asked to stop bearing down, and as the rest of the head is born by extension the attendant gently guides it until the chin is delivered. The next contraction brings the anterior shoulder under the pubis, followed by the posterior shoulder and the rest of the body by flexion in an upward curve. From the time that the head is born by extension the mother can watch the delivery step by step.

Frequent sips of water are given during labour to maintain hydration, and if the patient shows signs of becoming tired she is given 20 ml. of 20 per cent glucose solution intravenously, repeated as necessary. The progress of labour is assessed by vaginal examinations—never by rectal examination, which may be painful.

It should be emphasised that in labour the patient has full control, this being the outcome of her antenatal training, and that there is complete co-operation between the attendant and patient; there is no domination of the patient's emotions by the attendant's will, such as one finds in the Grantly Dick Read and hypnotic methods of childbirth.

Personal Observations: Fifteen labours were actually witnessed; three being followed throughout. No patient was seen to receive any analgesic, and, except for the one forceps delivery, no anaesthetic. All the patients showed complete control, and one could sense the complete trust and confidence between the patient and her attendant. When questioned, the patients said they were free from pain during labour, although seven of them admitted to certain unpleasant sensations during the second stage which had been surmounted by their desire to give the child its best chance and not to fail in their experience of a natural process. The multiparae bore striking testimony to the system, for they all said there was no comparison between this and their previous confinements which they had had by orthodox obstetrics. To the obstetrician, the outstanding points are (1) the woman's complete control of her labour and emotions until the head is crowned, *without* guarding of the perineum and without pressure on the vertex; and (2) the excellent condition of the babies, which cried lustily immediately they were delivered.

Deliveries Witnessed by Author:

No. of cases, 15 (primigravidae 11, multiparae 4)
Normal deliveries, 14
Instrumental deliveries, 1 (android pelvis and deep transverse arrest)
Average length of labour: primigravidae 12¼ hr., multiparae 8 hr.
Episiotomies and/or perineal lacerations, 1
Postpartum haemorrhage, 0
Foetal and maternal mortality, 0

All the infants delivered spontaneously cried as soon as they were born.

Results from Dr. Lamaze's Clinic

Maternity: There are 42 beds, in units of 2–4 beds per room, and 5 labour rooms, 4 of them single-bedded and 1 double-bedded for untrained cases, well removed from the former.

Deliveries: 150 per month.

Puerperium: Up on second day, home on eighth day. Return two weeks later for postnatal examination.

Results in Relation to Pain: Of the 1,591 deliveries, 587 were claimed to be painless; 346 very good; 403 good; 174 mediocre; and 81 failures, arising from obstetrical or psychological difficulties.

Analysis of 1,049 *Deliveries, March* 1952 *to April* 1953*:* There was an over-all reduction in the duration of labour, but no exact figures are available.

In 90 per cent of cases there was a normal vertex presentation, and 75 per cent of the total were delivered successfully.

Instrumental deliveries: 7.7 per cent.

Manual removal of placenta: 7 per cent (no oxytocics used).

Caesarean section: 1.1 per cent.

Perineal lacerations and episiotomies: 5–10 per cent.

Prematurity (birth-weight under 2.5 kg.): 124 of 1,335 deliveries.

Failures: The incidence of failures is about 10 per cent but varies according to the experience of the operator. This is well illustrated by Dr. Lamaze's figures in two periods:

Period	*Total Failures*
1952–1953	4.3 per cent
1956–1957	2.0 per cent

In the event of failure the usual analgesics are given, and provided the reasons for their use are explained to the patient there is unlikely to be any untoward reaction on her part.

Natural Childbirth at the Hôpital Saint Antoine, Paris

This was one of the hospitals chosen for the Minister of Health's investigation on painless childbirth, containing a large and modern maternity unit under Professor Mayer. Several days were passed studying their methods and results. However, I am doubtful whether a parallel can be drawn between the results obtained at Dr. Lamaze's Clinic and those of the Hôpital Saint Antoine. Firstly, it is difficult, if not impossible, to inspire one's staff and patients with belief in a method in which one does not believe oneself or at best is doubtful about, and in the practice of painless childbirth it is essential to have the patient's confidence. Secondly, the criterion was not absence of pain but its limitation and control. Needless to say, comparison of the trained and control groups showed little difference except in the duration of labour, which was shortened in the trained group.

It is of interest to note that in a second control group without analgesic drugs the duration of labour was shortened to equal that in the trained group.

Results for the Child: There was no appreciable fall in the incidence of asphyxia neonatorum or of cerebral haemorrhages at birth (Dr. Lamaze having reported a dramatic fall in both).

	National Figures (France)	*Dr. Lamaze's Clinic*
Asphyxia neonatorum	7.5%	2.8%
Intracranial haemorrhage	1.4%	0.6%

Moscow

An opportunity of observing how closely the technique and results of Dr. Lamaze's Clinic in Paris corresponded with those in the Soviet Union was afforded by a visit to Moscow in October 1959. The only two points in which the training differs are: (1) Dr. Lamaze does not restrict the training to those with a normal foetal presentation, as is done in Russia; and (2) the breathing exercises used in labour differ in detail.

In a personal communication from Moscow (1960), Professor Syriavatko states that the incidence of severe asphyxia at birth is now in the region of 1.1 per cent, having fallen from 6–8 per cent since the introduction of psychoprophylactic childbirth. The incidence of cerebral palsy is not given, but it would be difficult to compare it with the incidence in this country without knowing the figures for the individual factors, such as haemolytic disease of the newborn, which should be lower in the Soviet Union with its smaller percentage of Rhesus-negative mothers. The most recent vital statistics for the Soviet Union (Georgiou 1959) give the maternal mortality as 0.07 per cent and the foetal mortality as 1.77 per cent for 1957.

Conclusions

Five years' experience of the Soviet method has led to the firm conviction that

it is superior to all other methods of painless childbirth now in use, and the benefits to the mother and her child would more than justify the necessary expenditure on sufficient trained staff and suitable accommodation. It would appear reasonable, as a long term result, to expect the general use of this method to produce a substantial fall in the incidence of cerebral palsy.

SUMMARY

A critical survey is given of the historical, theoretical and clinical aspects of psychosomatic childbirth in general and the Soviet method in particular.

The relief of pain in childbirth with analgesic drugs carries definite risks to both mother and child, and there are many advantages in a system of childbirth in which the relief of pain is achieved by careful antenatal preparation of the patient, both physical and mental.

Personal experience of the psychoprophylactic method was gained at the maternity clinic of the late Dr. Lamaze in Paris, and that the method practised there carefully reproduces its prototype in the Soviet Union was verified during a visit to Moscow. In other clinics where psychosomatic childbirth has been introduced, failure to obtain good results appears to be the fault of the staff and not of the method. For the successful application of the Soviet method the teamwork of a highly trained enthusiastic staff is essential, together with suitable environmental conditions for antenatal preparation and delivery.

No other system of psychosomatic childbirth gives the consistently high results of the Soviet method, and a plea is made for its wider adoption.

RÉSUMÉ

La Méthode soviétique ou psychoprophylactique de l'accouchement sans douleur.

Revue critique des aspects historiques, théoriques et cliniques de l'accouchement psychosomatique en général et de la méthode soviétique en particulier.

L'atténuation de la douleur par les substances analgésiques au moment de l'accouchement comporte, pour la mère et l'enfant, des risques bien déterminés. Suit l'énumération des multiples avantages d'un système d'accouchement dans lequel la suppression de la douleur est complétée, avant la naissance, par une soigneuse préparation physique et psychologique de la patiente.

Il a été vérifié, au cours d'une visite à Moscou, que la méthode employée à la clinique obstétricale de feu le Dr. Lamaze, à Paris, où l'auteur a acquis son expérience personnelle, est la reproduction minutieuse de son prototype de l'Union Soviétique. Dans d'autres cliniques pratiquant les accouchements psychosomatiques, les échecs semblent être imputables au personnel et non à la méthode. Le succès de la méthode soviétique tient essentiellement au travail d'équipe d'un personnel hautement qualifié et enthousiaste et aux conditions de milieu favorables à la préparation prénatale et à la délivrance.

Pour l'auteur, aucun autre système n'atteint les résultats régulièrement excellents de la méthode soviétique. Enfin, il est fait appel à une plus large adoption de l'accouchement psychosomatique, si profitable à la mère et à l'enfant.

ZUSAMMENFASSUNG

Die Sovietische oder psychoprophylaktische Methode der schmerzlosen Entbindung.

Kritische Durchsicht der historischen, theoretischen und klinischen Gesichtspunkte der psychosomatischen Entbindung im allgemeinen mit besonderer Rücksicht auf die sovietische Methode.

Die Milderung des Schmerzes durch analgesische Mittel während der Entbindung setzt die Mutter und das Kind ganz bestimmten Gefahren aus. Es folgt die Aufzählung der zahlreichen Vorteile eines Entbindungssystems, in dem die Aufhebung des Schmerzes, vor der Geburt, durch eine sorgfältige körperliche und psychologische Vorbereitung der Patientinen ergänzt wird.

Die eigene Erfahrung des Aut. über die psychoprophylaktische Methodewurde in der Klinik für Geburtshilfe des verstorbenen Dr. Lamaze in Paris erworben und während eines Besuches in Moskau wurde bestätigt, dass diese Methode die genaue Wiedergabe ihres Prototypes aus der Sovietunion darstellt. In anderen Kliniken wo psychosomatische Entbindungen ausgeübt werden, scheint es, dass man die Misserfolge dem Personal und nicht der Methode zuschreiben muss. Der Erfolg der sovietischen Methode ist wesentlich durch die Zusammenarbeit eines hochgradig qualifizierten und begeisterten Personals, und die für die pränatale Vorbereitung der Entbindung günstigen Bedingungen der Umgebung, bedingt. Der Meinung des Autors nach, erreicht kein anderes System die regelmässig vortrefflichen Resultate der sovietischen Methode.

Endlich wird ein Aufruf für eine breitere Verwendung der psychosomatischen Entbindung gemacht, die der Mutter und dem Kinde in dem Gebiete der präventiven Medezin so viel Nutzen bringt.

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Modern Concept of Congenital Dislocation of the Hip

LARS ANDRÉN

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THE first description of congenital dislocation of the hip dates back to Hippocrates, and its aetiology and treatment have for centuries attracted much attention.

Many theories have been offered to explain the primary cause of congenital dislocation of the hip. These theories fall into two groups: one ascribes the dislocation to intra- and extra-uterine mechanical factors, and the other to a hereditary factor, particularly an anomaly due to arrest of development.

It is widely believed that the condition is caused by congenital dysplasia of the hip-joint with secondary dislocation as a result, and that treatment with long-continued immobilisation brings about a kind of nearthrosis in the acetabulum. It is difficult to bring this widely accepted concept into line with clinical observations, but before discussing this discrepancy it might be convenient to recapitulate our knowledge of congenital dislocation of the hip.

Present Knowledge

Congenital dislocation of the hip is six times as common among females as among males. It is about 20 times more common among children born in the breech position than among those delivered in the cephalic position. Of children with congenital dislocation of the hip delivered in the breech position, females are twice as common as males. If the dislocation is unilateral, it is more common on the left side than on the right.

In enzygotic pairs of twins, congenital dislocation of the hip occurs in both infants in 30 per cent of cases, but in only 3 per cent of dizygotic pairs. In about 20 per cent the condition is familial.

The incidence of the disease is higher in some countries than in others, but this difference appears to be due to geography rather than race. The condition is commoner in children born in winter than in those born in summer. This seasonal variation has been reported from Japan, Hungary, Germany, England and Italy.

The incidence of the disease is highest among the peoples who carry their infants with their legs adducted and extended—e.g. among Indians, who tie their infants to cradle-boards, and among Lapps, who carry their infants in *komsen*, a kind of cornet-shaped rucksack. It is also fairly high among the peoples whose custom it is to bandage their infants.

Dislocation of the hip can always be diagnosed at birth. If the dislocation is reduced and the hip immobilised for a short time—less than two months—no dysplasia will occur. But if the condition is left untreated, dysplasia, which is not demonstrable at birth, will soon develop. In animals, dysplasia can be readily produced by experimental dislocation of the hip. Many cases have been described

in which dislocated hips have been reduced spontaneously without subsequent dysplasia.

In dislocation of the hip the joint capsule is elongated, and this elongation facilitates both dislocation and reduction. The hip can be reduced by so-called Ortolani's manoeuvre, first described in 1864 by W. Roser. In infants with elongation of the capsule the symphysis is often also unstable, as in pelvic insufficiency of pregnancy.

Newborn infants excrete maternal oestrogens in the urine almost entirely as oestriol. Newborns with congenital dislocation of the hip also excrete small amounts of oestradiol-17β and oestrone. This excretory pattern can also be induced in normal newborns by injection of oestradiol-17β. Treatment of cattle with oestrogens can also cause dislocation of the hip as a side-effect. It has often been observed, though rarely mentioned in the literature, that women with congenital dislocation of the hip are of a very feminine type.

Mechanism

Judging from the observations set forth above, congenital dislocation of the hip is not produced by a single agent but rather by the combined effect of a number of different endogenous and exogenous factors.

Since experimental dislocation of the hip is followed by dysplasia unless the joint is reduced and immobilised for a short period, there is no reason to assume that the dysplasia is primary to the dislocation. On the other hand, there is strong evidence for the dysplasia being secondary to the dislocation.

Dislocation of the hip is present at birth and is due to elongation of the joint capsule which permits the femoral head to slip out of the acetabulum. This relaxation soon disappears if the joint is reduced. The symphysis is also unstable, as in experiments with animals treated with relaxin or oestrogen.

Hormonalysis of the urine from newborn infants with congenital dislocation of the hip has shown a disorder in oestrogen metabolism.

The instability of the symphysis, the metabolic disorder, the sex distribution (6 females:1 male), and the extreme femininity of females with the condition suggest that the primary causal factor is a hormonal disorder, and that this disorder is hereditary. In addition, the response of the joint capsule and the symphysis surely varies from one infant to another, it being known that the effect of oestrogen on the symphysis varies from animal to animal and from species to species. The intensity of the response to oestrogen probably also depends on hereditary factors.

An indubitable causal factor is the incorrect posture of newborns—i.e. incorrect position of the legs. Adduction and extension of the legs increase the risk of luxation. Abduction and flexion prevent the development of the condition. In India, China and Africa, for example, the infants are carried about with their legs flexed and abducted, and in those countries dislocation of the hip is extremely rare or unknown.

As to the increased frequency among children in association with breech presentation, the condition may be explained by stretching of the joint capsule during delivery.

The seasonal variation and geographical distribution suggest the possibility of an exogenic factor, possibly nutritional, capable of disturbing oestrogen metabolism, enhancing the response of pelvic tissues to oestrogen, or in some other way favouring relaxation of the joint capsule, which in turn enables the femoral head to slip out of the acetabulum.

There are few diseases in which the diagnosis is so easy, treatment so simple

and the results so excellent as congenital dislocation of the hip, provided the infant is examined immediately after birth. If post-natal examination is neglected, this will delay diagnosis and treatment, the results will often be poor, and the patient will sometimes be partially disabled for the rest of his life.

With our present knowledge of congenital dislocation of the hip there is no excuse for any case remaining concealed or not being adequately treated from birth.

SUMMARY

It is now established that the cause of congenital dislocation of the hip is elongation of the joint capsule. This elongation is largely ascribable to maternal hormones, which also produce temporary instability of the pubic symphysis in the infant. Hormone analysis has shown a decreased breakdown of oestrogens in newborn infants with congenital dislocation of the hip.

Immediate postural treatment for a couple of weeks will produce a permanent cure.

RÉSUMÉ

Concept moderne de la luxation congénitale de la hanche

On peut à présent considérer comme établi le fait que l'élongation de la capsule de l'articulation de la hanche est la cause des luxations congénitales. Cette élongation est en majeure partie imputable aux hormones maternelles qui produisent également chez le nourrisson une instabilité symphysaire momentanée. L'analyse hormonale a montré un catabolisme d'oestrogènes chez les nouveau-nés atteints de luxation congénitale de la hanche.

Un traitement postural immédiat de deux semaines environ amènera une guérison durable.

ZUSAMMENFASSUNG

Moderne Auffassung der angeborenen Verrenkung der Huefte

Es kann jetzt als festgesetzt betrachtet werden, dass die Verlängerung der Kapsel des Hüftengelenkes die Ursache der angeborenen Verrenkungen ist. Diese Verlängerung ist hauptsächlich den Hormonen der Mutter, die auch beim Säugling eine momentane Unbeständigkeit der Symphyse erzeugt, zuzuschreiben. Hormonanalyse hat Katabolismus der Oestrogene bei den Neugeborenen mit angeborener Verrenkung der Hüfte gezeigt.

Eine sorortige ungefähr zwei Wochen lange Haltungstherapie wird dauernde Heilung bringen.

SPECIAL ARTICLES AND REPORTS

Paediatrics in Bergen

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BERGEN is very young as a university city—in fact, only 13 years old—but its Medicine has always been of good quality. The Medical Society of Bergen was founded in 1831, and is the oldest medical society in Norway. Many Bergen medical men are well known internationally, among them the late Armauer Hansen, the discoverer of the Lepra bacillus. The Norwegian Paediatric Society was founded in 1919 on the initiative of the Bergen paediatrician, Carl Looft.

1950 was an important year for paediatrics in Bergen, for Barneklinikken, the first children's hospital in the western part of Norway, was opened then. Barneklinikken was given by the Swedish people to commemorate the liberation of Norway in May 1945 from the German occupation.

Barneklinikken has 95 beds, distributed between 5 wards: an infant ward for mature and premature babies, one for small children, one for schoolchildren, an isolation ward, and a ward for patients with primary tuberculosis. The turnover is about 1,900 patients a year. Nine doctors are in full-time employment. (The British consultant system is in use only at a few private hospitals in Norway.) Barneklinikken is a combined community and university hospital, which covers a population of about half a million, of which about 120,000 are in Bergen itself. Among the clientèle are many emergencies and also many rare cases—a great advantage for the teaching of medical students. The teaching of paediatrics to 40 medical students a year is in the charge of Prof. Alfred Sundal and his two senior assistants.

The hospital also has an outpatient department, intended for follow-up studies and teaching purposes, where patients who have been treated in the hospital and some children referred from private practitioners are examined. One of the registrars deals with the routine work under the supervision of a senior assistant.

There are six paediatricians in private practice in the Bergen area, who deal with most of the outpatients. Children needing hospital care are in general sent to Barneklinikken but are usually referred back to the private paediatricians for their follow-up.

The welfare service for children is well developed. Every district in Bergen has its welfare centre, where mothers may bring their infants and small children for health control and vaccination. Barneklinikken serves as one of these clinics. A resident does the routine work under the supervision of one of the senior assistants, and medical students attend the clinic for teaching. Special physicians are in charge of health control in schoolchildren.

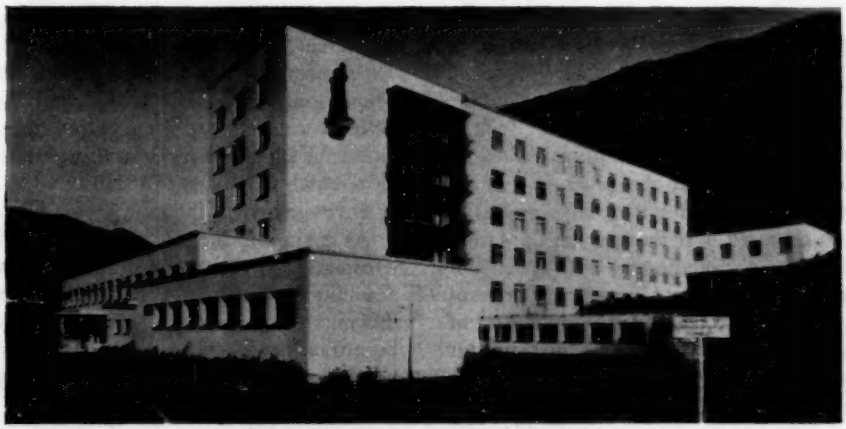
The psychiatric service is not good, but will probably improve in the next few years. A young paediatrician has taken up a scholarship for 2 years' study abroad, and on his return he will become head of a new psychiatric department for children attached to Barneklinikken. A hospital for cerebral palsy has been in existence for some years.

Some clinical research work is being done at Barneklinikken, and about 100 articles have been published in medical journals since 1950. A number of lectures on medical and other subjects have been given by doctors working there.

In the Norwegian health service the general practitioner is the corner-stone of the system. It is a basic principle that the patient should be free to choose his doctor. The system works on the following lines. The patient first consults his private practitioner, who decides the course to be taken and what treatment or further examinations are necessary. If the practitioner feels that the case is beyond his scope, he refers the patient to a specialist or sends him to a hospital. The insurance plan favours this procedure, and it does not usually refund the specialist's fee to the patient unless he has been referred to the specialist by a general practitioner. Parents may, however, go direct to a paediatrician with their children if they are under 2 years old.

There are no open outpatient departments in Norway on the British pattern except in association with some university departments, where they are needed to provide material for teaching purposes.

Compulsory health insurance for everyone was introduced in 1956. The relationship between the doctor and the health insurance scheme is relatively free. With very few exceptions it works on the fee system. The doctor is paid according to the amount of work performed, on the basis of a tariff established by the Norwegian Medical Association after informal discussions with the health authorities. Health insurance pays part of the doctor's fee, the remainder being covered by the patient.



The Children's Hospital, Bergen

The Paediatric Research Unit at Guy's Hospital

In endowing the first chair of paediatric research in Britain, the National Spastics Society has made available the largest single grant ever given to a university department in this country. No constricting strings are attached to this £2 million windfall. The research programme on which Prof. Paul Polani is now embarking is to cover diverse aspects of developmental biology. His interest centres on the neurological disorders of childhood, including mental defect and cerebral palsy, on congenital disorders and malformations, the tumours particular to children, and the leukaemias. From this varied field we may expect a rich harvest to nourish the investigation of cerebral palsy.

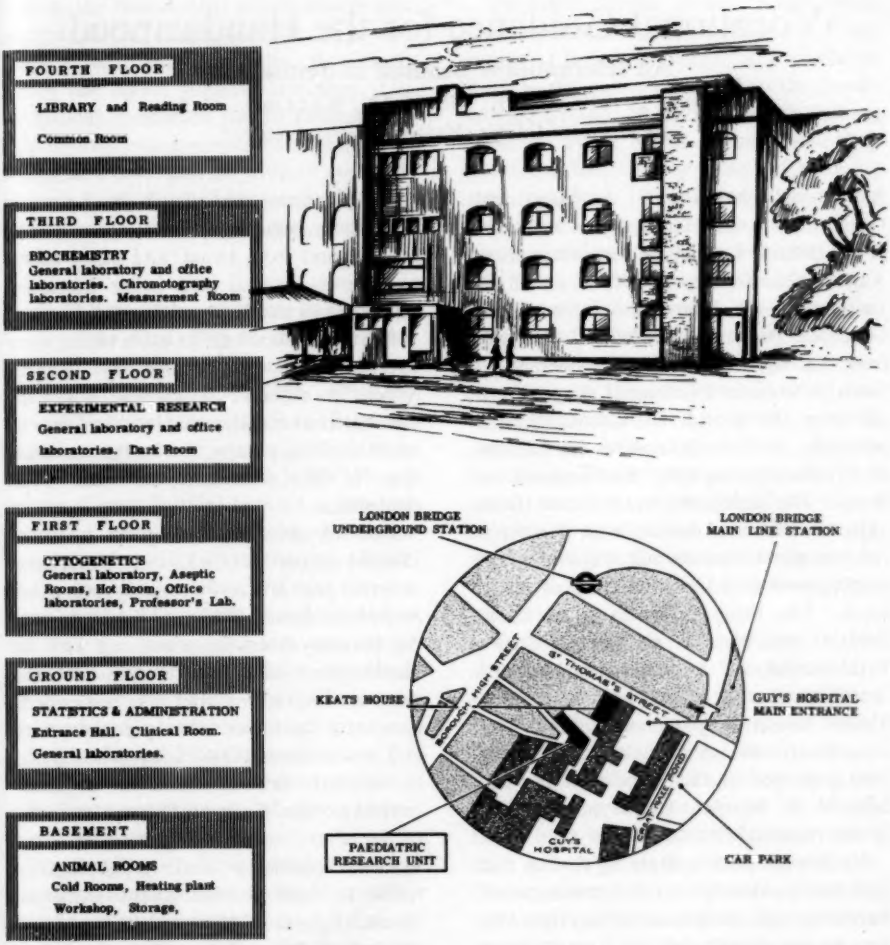
The close liaison which the National Spastics Society has maintained with Guy's Hospital, where it has supported an active research group since 1955, made the hospital a natural choice of home for the new unit. Thanks to the foresight of its administrators and the generosity of its benefactors, building sites have gradually been acquired over the years in the Guy's precinct. A warehouse will house the new department and provide, after conversion, some 5,000 to 6,000 square feet of floor space. Of the five storeys in this building, three will be devoted to the divisions of biochemistry, cytogenetics and immunology, and to the experimental section. The department of statistics and administration will be on the ground floor. The library, with its proposed reprint service, on the top floor is to be available to outside workers. This, and the cytogenetics unit, are likely to be among the major benefits which Guy's will enjoy as the result of the new development.

The unit will in turn draw on the clinical and academic resources of Guy's, notably the department of child health (where the Professor has ten beds in his own right), and the departments of anatomy, cardiology, endocrinology, neurology, chemical pathology and physical medicine. Dr. Hume Kendall, the Director of the department of physical medicine, is to be a part-time research fellow in the Paediatric Unit.

Although the conversion of the building was only begun in mid-February, the divisions of cytogenetics and epidemiology are already functioning, and work in the experimental section has begun, with John Hamerton, Alison McDonald and Roy Spector as lecturers. In addition to the academic staff there will be a rising number of research fellows. A full staff of 40 to 45 is envisaged when the unit is complete.

As part of the University and the Hospital, the staff has undergraduate teaching responsibilities. The width of Paul Polani's vision is seen in his determination to attract new research workers to Guy's, and his intention to provide facilities and offer guidance for clinical research to students and junior staff in the hospital.

We wish this enlightened venture a continuation of the good fortune which has heralded its birth and brought talent to its baptism. BARBARA EVANS



WAREHOUSE TO RESEARCH UNIT

The building now under conversion at Guy's Hospital, and how to reach it by road or rail.

Vocational Guidance for the Handicapped

An International Seminar in Jerusalem

Reported by MISS M. R. MORGAN, D.S.S.Lond., M.I.P.M.
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AN International Seminar on Vocational Guidance for the Handicapped was held at the Hebrew University, Jerusalem, from August 22 to September 1, 1960, under the auspices of the International Vocational Guidance Association. The 150 delegates from 15 countries gathered together to listen to lectures by eminent people from all over the world, to discuss mutual problems, and to visit centres for training and rehabilitating the handicapped in Israel. The delegates were drawn from various disciplines dealing with this problem—medical, educational, psychological, employment and the wide field of social work. The three delegates from Great Britain were Mr. W. G. Brown, Senior Psychologist with the Ministry of Labour's Youth Executive, Miss M. O. Davies, Senior Youth Employment Officer, who co-ordinates the services for handicapped young people in the London area, and Miss M. R. Morgan, Employment Officer of the National Spastics Society.

Visits were paid to training centres and sheltered workshops for different types of handicap, and delegates were impressed by the amount of work that had been achieved in a comparatively short space of time. The problems facing Israel are many and varied, for they have to deal not only with their own handicapped young people but also with the many aged and disabled refugees who have been pouring into the country from all over the world, bringing with them their different cultures and social problems.

Great interest was shown in the work done in England in all fields, particularly by delegates from Israel, and many asked to receive medical and other literature published by the National Spastics Society.

During the seminar six main topics were covered very thoroughly, by lectures (given in different languages, but with simultaneous translation), by discussion in small working groups, and by the presentation of the summaries to the main conference.

The introductory talk, given by Prof. Donald Super of Columbia University, covered the *Whole-Personality Approach to Rehabilitation*. Professor Super pointed out that any counsellors working with the handicapped have both professional and personal limitations, and it is not easy to dissociate ourselves from preconceptions and misinterpretations of fact when trying to reach a fair appraisal of a handicapped person. Each professional member of the team—vocational counsellor, social worker, physician and psychologist—tends to look at the client from his specialist point of view and to exaggerate his side of the problem. 'But when these and other rehabilitation specialists work together, either as members of a team or in consulting capacities, the limitations and biases of the individuals may be surmounted. The pooling of information and the airing of differing points of view may lead to the formulation of a picture of the client which approximates the reality.'

Professor Super went on to elaborate on the elusive concept of the whole personality, which has three entities, all interdependent —first, the Social Self, which others see; second, the Self Concept, which the person himself sees; and third, the 'Real' self, which the expert studying him sees. The vocational counsellor has to analyse and help to clarify the perceptions of those with whom he works, and his work of appraisal is never really finished but continues as he works with his client and with his community.

Topic 1: Assessment of Work Potential as the First Step in the Vocational Rehabilitation Process.

Talks were given on *The Use of Psychological Tests* by Mlle. Van Roy (Belgium) and *The Appraisal Process in Rehabilitation* by Professor Jacobs (U.S.A.), Mr. W. G. Brown (Great Britain) showed a film and described the work of the Industrial Rehabilitation Unit under the general title of *Try-Out, Observation and Evaluation in a Pre-Vocational Unit*. Mlle. Van Roy pointed out that the counsellor's task consists of collecting the required data on which advice is to be based, and this can be included under three main headings:

1. The degree of intelligence.
2. The evaluation of various aptitudes.
3. The establishment of the psychological set-up.

She emphasised that some types of handicap, in which she included cerebral palsy, need special techniques of testing or specialised personnel for the particular problems posed by this handicap.

In the discussions that followed it was obvious that both general intelligence and aptitude tests are much more widely used in some countries than in others, and opinion varied considerably on the use of personality and projective tests. It was generally, agreed, however, that tests seem to be the best available means for determining intelligence and latent abilities, though some aptitude tests need to be adapted for specific handicaps.

Professor Jacobs quoted a definition, from Allan's 'Rehabilitation: a Community Challenge', which is a challenge both to the community and to the handicapped person: 'Rehabilitation is making a person aware of his potential and then providing him with the means of attaining that potential.' This needs the active co-operation of the handicapped man or woman, and two of the main objectives of the counsellor are to promote his client's self-understanding and to assess his acceptance of his disability.

The importance of the interview was also stressed, though it was admitted that it is often not possible to assess a handicapped person's potentialities in one interview. The evaluation process is a continuous one, which should be started as early as possible and be carried out in a situation where the young person can be observed and tried out on different types of work.

Particular interest was shown in Mr. Brown's description of the try-out and observation in different types of work in a practical industrial setting at the British Industrial Rehabilitation Units.

It was agreed by all speakers that this specialised evaluation should be undertaken by a team of professional workers, each of whom is an expert in one particular aspect. The composition of the team will vary according to particular requirements, but the importance of co-operation and joint consultation between members of the team was stressed throughout the seminar.

Topic 2: The First Steps in the Vocational Guidance of the Handicapped Child.

M. Beaussier (France) covered the subject of *Counselling and Guidance of*

Parents; Mrs. B. Malinovsky (Israel) spoke on *Career Counselling for Retarded Children;* and Mlle. Nepveu (France) dealt with *Educational and Vocational Guidance for Physically Handicapped Children.*

All speakers agreed that effective guidance of the handicapped child is impossible without more or less intensive work with his parents. The parents' attitude is decisive for the development of the child's self concept and his adjustment to normal environment. Parents must be helped to recognise and face their basic attitude towards the child, which may be rooted in guilt, shame or fear, so that they can learn to achieve a realistic acceptance of him as a handicapped person. Group activities among parents are most helpful and should be encouraged. Through these organisations outlets are provided for positive action, common problems can be shared, and mutual help and support given. Pressure should be brought to bear on the public, and every possible means should be used to combat and overcome the community's prejudices and ensure that these children are accepted into the adult world.

The principles of continuous counselling and evaluation are fundamentally important when advising the handicapped child, and guidance and prevocational training should be part of all educational activities. The child should learn to live with his handicap in normal surroundings and to develop positive attitudes and character traits. Activities in the educational programme should be directed towards helping him to understand and accept his possibilities and limitations and then to adapt his aspirations to reality. Parents too often overestimate or underestimate their child's potentialities and have unrealistic vocational goals for him. Both the child and his parents should be informed about the types of work which might be suitable for him, by talks and visits to factories, offices, etc.

It was agreed, however, that in many cases of congenital handicap the child is not ready for normal training or placement immediately after completing his statutory education, and he is often too immature physically, emotionally and mentally for effective guidance on his future career. A period of continued education and treatment seems essential for many of these adolescents, and preliminary evaluation and assessment should be followed up regularly and revised whenever necessary.

At present the handicapped child and his parents are too often given conflicting advice at various stages by different professional workers. It is essential to prevent this happening, and this overlapping can only be avoided by ensuring that there is close team work and that one of the members of the team dealing directly with the child should also be responsible for advising the parents.

Topic 3: Vocational Guidance of Handicapped Adults

Lectures were given by specialists from different countries on the various handicaps, including motor and sensory defects and medical and mental disorders. The paper given by Dr. Knook (Holland) on *Evaluating Motor Propensity in Vocational Counselees*, covered a wide field. He considered that motor propensity is an independent faculty of man, comparable with and about as essential as character, intelligence and temperament. 'A handicap in mobility, from whatever this may result, gives both a definite and a specific imprint: it gives the man a different personality for better or worse.'

One of the points Dr. Knook made was that a handicapped man in the performance of his job is just like any other man. He should be trained for a job adequate to his potentialities and possibilities but *not* to more than he would have

had if he had not been handicapped. Not everybody—and thus not every handicapped person—can be a skilled worker. 'He should be treated as a brother man, but not wrapped in cotton wool; he also has a duty, a task, and should be helped to help himself. Therefore the vocational counselling and the rehabilitation should be done thoroughly, but in the minimum time possible the handicapped man should be put on his feet, his own feet, and be left there.'

In most of these talks the emphasis was on adults who had acquired handicaps and needed readjustment and rehabilitation, as it was hoped that in time most of those who had congenital handicaps would have been adequately advised in childhood before leaving school.

It was agreed, however, that there was a great need for special facilities for the vocational guidance of handicapped adults and that these should include the provision of specially trained counsellors with suitable academic and practical knowledge, adequate training facilities and more outlets for employment.

Topic 4: The Interdependence of Vocational Guidance and Other Rehabilitation Services.

Dr. Ginzburg (Israel) dealt with *Medical Rehabilitation* and Mlle. Baumann (France) with *The Social Services and the Part they Play in Vocational Guidance*. Dr. Ginzburg pointed out that there was a widespread tendency for medical rehabilitation and social and vocational rehabilitation to be looked upon as two separate and distinct entities. In his talk he emphasised the need for co-operation and co-ordination—even if the services could not all be undertaken in the same place.

Mlle. Baumann underlined the need for a fuller consideration of the social implications and in discussion it was found that provisions for both medical and social rehabilitation vary considerably in different countries and even within the same country, and that similar tasks are undertaken by a variety of different people. In spite of this diversity it was agreed that each had its part to play but a team approach was essential if both gaps and overlapping were to be avoided. All members of the team should be specially trained and fully informed both on the problems of the handicapped and on the requirements of industry and work in general.

Topic 5: Vocational Training and Placement of the Handicapped.

Principles of Re-adaptation of the Physically Handicapped were covered by M. Bertrand (Belgium) and *Vocational Placement* by Dr. Pardun (Germany). M. Bertrand gave a very comprehensive lecture on the principles of re-adaptation, among which he covered the development of the way in which the physically handicapped have been regarded in the evolution of human history. In summing up his talk, he outlined three main problems which have to be tackled—namely, the provision of:

(1) Facilities for the maximum development of the mental faculties of the physically handicapped. (In the speaker's opinion, cases are given up as hopeless far too soon.)

(2) Special training units which will take the particular psychology of the handicapped person into consideration, do everything possible to free him from the obsession of his handicap, and give him a more hopeful and attractive future to which he can look forward.

(3) Specialised psychological services to prepare the employer for the delicate task of establishing contact with the physically handicapped. ('How much hope would be justified, how many clumsy mistakes would be avoided if

employers knew how to behave towards the handicapped!')

(4) Plans for systematic social aid. ('Vocational training of the handicapped is sure to present us with a multitude of problems which will not be easy to solve, but we are deeply convinced that if psychological assistance is developed, if the handicapped feels at ease in his training environment, the technical question will recede to second place.')

In his talk on placement, Dr. Pardun dealt with the importance of evaluating different types of work and matching the handicapped person to the requirements, the approach to and preparation of employers, and the provision of specialised employment for the more severely handicapped.

The lectures were followed by a lively discussion on the best methods of training and finding suitable jobs for different types of handicap. The need for training is apparent, but often there are insufficient openings of the right type, and the general employment situation must always be taken into consideration to ensure that there are sufficient vacancies for men and women trained in specific jobs. The question of whether the handicapped should be trained in special units was also discussed fully, and it was agreed that in some cases special facilities, with specially trained staff, were necessary if the handicapped were to benefit fully from the courses. A campaign of publicity should be initiated to draw employers' attention to the qualities of disabled employees, and more outlets for employment must be found by mass propaganda, by canvassing employers and by special placement on an individual basis. There is a need, however, for many more special workshops for those who cannot compete in the free labour market; this provision should not be left to one body but should be sponsored by the State, so that national resources can be enlisted and services co-ordinated.

Topic 6: Co-ordination and Integration of all Services Dealing with the Handicapped.

The final lecture was given by Dr. Giora Lotan (Israel), who dealt mainly with the situation in Israel, where a number of different departments are responsible for different types of handicap. The provisions vary considerably and some handicaps have much more extensive services available to them than others.

In the ensuing discussions the existence of a wide variety of agencies dealing with rehabilitation was fully recognised, and these can be divided generally into governmental and voluntary. It was agreed that there is a place for all types of organisation, but that there might be closer co-operation and a greater awareness of the facilities provided by other bodies dealing with the same type of work.

Every handicapped person is entitled to facilities of the highest quality available, irrespective of the origin of the disability, and it was recommended that a *Directory of Services* should be published annually by the competent Government agency and made available to all who are concerned with this work.

Passages that one of the lecturers quoted from United Nations publications probably best sum up the conclusions and views of the delegates at the seminar, and it is hoped that in all countries measures will be taken to implement these recommendations.

'The time has long passed when the handicapped child or adult could be regarded as an object for exploitation or simply as fated to live on charity. Modern medicine and sociology offer them a new and hopeful outlook. But if this promise is to be implemented and the physically handicapped are to be able to face life with a chance to succeed, the whole question of

the handicapped must be reconsidered from the viewpoint of the following principles:

'First, the physically handicapped person has the same claim to human rights as those who are not physically disabled, and is entitled to receive whatever his country can offer in the matter of protection, aid, and possibilities of adaptation.

'Second, by the very nature of his disability the physically disabled person is exposed to mental and psychological disturbances caused by deep-seated feelings of dispossession and frustration; consequently, he has a particular claim on the sympathy and the active aid of the community.

'Third, the physically disabled person can, if provided with judiciously selected means, develop the resources still available to him to an unexpected degree and more often than not become an active element in the country's economic life, instead of remaining a burden to himself, his family and the state.

'Fourth, the physically disabled person owes it to the community to contribute his share to the economic prosperity of his country in any way made possible by his rehabilitation and training.

'Fifth, the chief ambition of the physically handicapped person is to lead an independent life within a normal community, rather than to spend his life in institutions reserved for those who share his infirmity or among invalids.

'Sixth, the rehabilitation of the physically disabled can only be successful if it is effected by the joint efforts of the social services and of specialists working as a team.

'The first task facing the international institutions is therefore to neglect nothing which can induce the world to accept this new understanding of physical disability.'

Jerusalem, steeped in history, was an inspiring place in which to hold such a seminar, though the ultra-modern Hebrew University campus provided a great contrast to the ancient walls of the Old City. The people of Israel have many problems facing them—industrial, social and cultural—but, as Dr. Lotan said in concluding his lecture: 'We know well that we lack experience in many fields and skilled manpower, but on the other hand we are supported by public opinion, which shows a growing understanding and preparedness to cope with the needs of the handicapped. Israel, which can exist only if it can use and augment its sparse natural resources, is not less dependent for production on the use of the capacities and even the reduced human resources of the handicapped. We are far from having solved the problem of our handicapped, but slowly people are becoming aware of the fact that we cannot afford to waste the human resources hidden in our handicapped population.'

L'École des Parents, Paris

For Research, Instruction and Training

A. J. DALZELL-WARD, M.R.C.S., D.P.H.
Medical Director, Central Council for Health Education, London

PARENTCRAFT is an interesting study for the social anthropologist, for, as Margaret Mead showed in her film, *Bathing Babies in Three Cultures*, the routine operations of caring for children are modified by national culture and have a profound effect on emotional development. The conventional idea of parentcraft is concerned mainly with general care and maintenance and protection from common dangers. Such a concept has been enthusiastically translated into syllabuses for senior schoolchildren, as well as being included in the regular activities of infant-welfare centres. However, such courses are concerned entirely with the development of manual skills and attitudes which will ensure good order and carefulness in the home, so that the child will be protected on the one hand and made happy and comfortable by the provision of his physical needs. The drawback is that such a concept of parentcraft leaves the parent unequipped to deal with the problems which are concerned with behaviour and relationships. Parents may search the conventional books in vain for guidance on how to handle such problems, save in the simplest exhortatory terms. There is usually no explanation of their role in the family relationships apart from what are usually described as 'duties and functions'.

It is true that in recent years there has been an attempt to tackle the emotional problems of childhood, and in many parts of Britain Health Department staff are being provided with opportunities for postgraduate training in those aspects of child psychiatry which can be applied in their own work. A lead was given by the Expert Committee on Mental Health of the World Health Organisation, which stated, in its report[1] in 1951, that all the public health workers who were concerned with the 'biologically vulnerable phases of life', such as pregnancy, should receive training which would give them insight into the motivations of their clients and would help them to approach their customary tasks in a more enlightened way.

In Britain such activities have been incorporated in the traditional functions of the Maternal and Child Welfare Service, which was founded originally on a basis of economic and social need. It would be wrong to say that this programme has been neglected, even if it is tackled in a diffuse manner, as pointed out by Stern[2] in his monograph.

On the other hand, the French concept of parentcraft for the promotion of emotional maturity is expressed in the organisation in Paris known as *l'École des Parents*. Here we see an organisation based primarily on the psychiatric and psychological concepts derived from child-guidance work. Thus the French school offers a deliberately rational approach,

[1] Expert Committee on Mental Health. Report on Second Session. Geneva: W.H.O. Technical Report Series, No. 31, April, 1951, p. 7.

[2] Stern, H. H. (1960) 'Parent education—an international survey.' Studies in Education. University of Hull with Unesco Institute for Education, Hamburg.

and makes an attempt to communicate to parents and to professional educators the main principles of emotional development. The founder, Madame Vérine, was herself an educationist and *l'École des Parents* was opened in 1929 against a background of changes in social conditions which tended to weaken the integrity of the family, together with the contemporary development of humanitarian studies, particularly those which throw light on the development of personality.

The aim of the school has always been to re-establish the basis for the role and authority of parents in conformity with modern ideas. Those ideas which can be communicated without causing anxiety, or diminishing a sense of responsibility, have been emphasised. Didactic methods have been rejected, and group discussion and informal participation methods are employed. The functions of the school are to conduct research, to organise training courses for group leaders and other educators, to answer parents' individual questions, to influence similar movements in the provinces, and to participate in radio and television programmes.

The constitution of the school is unique, in that the participation of the University of Paris as well as the Ministries of Education, Health and Population, and the organisations for Youth and Social Security, has been obtained. Grants from these official agencies and from the City of Paris help to swell the income derived from the sale of publications. The school has influenced developments in neighbouring countries, and its radio programmes are broadcast on the Swiss radio and Radio-Luxembourg. There are also wide international contacts through participation in non-Governmental organisations affiliated to the United Nations or the World Health Organisation.

Apart from special training courses held in Paris, group discussions are organised in schools and community centres in the provinces. Films are extensively employed as a basis for discussion. It is not believed that parents can be helped exclusively by the popularisation of psychology, which in itself can be dangerous without certain safeguards. It is believed that help can be given rather through personal relationships, and this is similar to the way in which problem families are rehabilitated in France. The needs of young people are also included, and the school tries to help youth to form mature relationships and to adapt to society. The quarterly journal, *Le Groupe Familial*, publishes research papers in psychology and sociology, often based on courses which have been given in the School of Medicine in Paris. Novel subjects, like 'the single father', relations between brothers and sisters, and family authority, have been tackled. There is also an impressive list of illustrated pamphlets which tend to be longer and more technical than popular health education literature in this country. It is difficult for a reader whose mother tongue is English to assess the level of approach, but a typical pamphlet, *l'Enfant Nerveux*, contains about 10 pages of text and seems to be aimed at an intelligent and educated reader. On the other hand, this is a lucid diagnostic account of the highly-strung child, including a classification of the principal causes and suggesting remedies. Among the suggested remedies it is rather surprising, today, to see a cold bath recommended 'for use as a medicament and not as a punishment'. This pamphlet would perhaps be best used as a complement to group discussions.

Thus, *l'École des Parents* acts as a channel of communication between the University, official agencies and the public. Its policy of training health educators is reinforced by its publications, and its extensive use of the mass media. This results in the influencing of public opinion throughout France regarding the problems

of emotional maturity. We should expect there to be some measurable results of this work on the various indices of mental health, such as juvenile delinquency, sexual misdemeanours, and alcoholism. On the other hand, we do not know how extensive the school's influence has been, or which sections of the public have been subject to its influence.

In Britain, the essentially local character of the Child Welfare and School Health Services provides a more certain cover of wide sections of the population. Although there is encouragement and co-operation from the centre, local professional enterprise and enthusiasm is as likely to be the moving spirit of work of this kind. The Central Council for Health Education has been engaged in human relations training[3] for the professional staffs of health authorities for nearly 10 years. Their policy has been to concentrate on the problems of pregnancy, infancy and childhood, in the spirit encouraged by the W.H.O. Expert Committee. Blacker[4] has also described a scheme for seminars for primigravidae, and this would seem to take parent education a step further from that undertaken by *l'École des Parents*, which itself advanced the concept of child guidance from the therapeutic to the preventive phase.

The long experience gained by the workers of this school, and the extensive researches they have conducted, will undoubtedly be of great value to all concerned with helping parents to play an effective role in the modern world.

[3] Dalzell-Ward, A. J., Porter, D. L. (1961) 'Teaching of mental health—human relations.' *Pub. Hlth. Lond.*, 75, 66–70.

[4] Blacker, C. P. (1958) 'Disruption of marriage. Some possibilities of prevention.' *Lancet*, i, 580.

What's to be done?

THE third instalment of a feature which arose out of a puzzling case described by Dr. Elaine Field in *Bulletin* Vol. 2, 1960, p. 89 and was carried on by Dr. Guy Tardieu as question-master and Mr. Sharrard and Mr. Gordon as respondents in Vol. 3, 1961, pp. 71-73. Further questions are being circulated, but suggestions are invited.—*Editor.*

The Problem . . .

Should cerebral palsied children be educated in schools or classrooms for cerebral palsy only?

. . . and some Replies

1. *From* **DENIS PIRRIE,** M.B., D.P.H., *Principal Medical Officer, London County Council.*

This is part of the general problem of special education, and the tendency is for ordinary schools to take more handicapped children. Cerebral palsy, too, means different things to different people. No doubt some of the clumsy, ill-co-ordinated children who find it hard to play football have 'cerebral palsy', and there is a continuous grade between them and the tetraplegic with multiple handicaps. Somewhere in the middle are those who form a quarter of the children in the London day schools for the physically handicapped, and I do not believe that all these 350 children would be better placed in C.P. schools.

What do children get in special C.P. schools? Special attention to their physical disabilities and special help with their learning difficulties, but the degree of specialised help that most require is of the same order that other handicapped children need, so that a school of say 150 children, of whom 40 have C.P., can serve a fairly accessible area and yet most kinds of help can be provided while the travelling time at each end of the day can be kept to something reasonable. Each child has his own problems to which we must try to find the best solution—social, temperamental, sensory and educational problems as well as physical—and inevitably sometimes the solution has to be a breaking of ties and admission to a boarding-school. You may have to wait fifteen or twenty years before you know whether you were wise to make such a recommendation.

There is another way to look at it. There is every need for specialised units for the young child aiming at admission to an ordinary school or to a school for the physically handicapped at 8 or so, and reserving the schools for C.P. children for those for whom this is not possible. At the same time these C.P. schools should be centres for research and training, where new methods can be developed which can in turn be used in the training and education of other C.P. children, other handicapped children and sometimes, indeed, of children in ordinary schools.

2. *From* **H. B. DAVIES,** B.SC. (ECON.,) *Headmaster, Thomas Delarue School (N.S.S.), Tonbridge, Kent.*

Ideally, the cerebral palsied should be encouraged to take their place among

the able-bodied, but most cerebral palsied children do need skilled treatment and specialised education from people who have an adequate understanding of the mental, physical and emotional patterns characteristic of the brain-injured. All but the very mildly affected present such complex educational problems that it is necessary to segregate them in special classes even within schools specially designed, equipped and staffed for the physically handicapped.

Cerebral damage is generally not limited to a single area of the brain, and defects of vision, total or partial, loss of hearing, perceptual hearing loss, and speech disorders occur in well over half the cases. We know now that there may be total physical involvement with normal intelligence, or a relatively small physical disability accompanied by serious defects of intelligence, or peculiar learning difficulties. Such children are subject to disturbances of perception and thinking which often obscure the very real intellectual ability they do possess, and even those whose intelligence is superior, judged by ordinary standards, are subject to some difficulties of conception and to a generalised and heightened sensitivity to external stimuli, which lead to difficulties in classwork.

These children must receive periods of absolutely individual instruction daily in the basic subjects, and also enjoy class activities as a group in oral lessons, music, drama, and the recreative subjects, if they are to make real progress and develop a rounded personality which will make them acceptable in normal society. This postulates very small classes of 6 or 8 at most as a *sine qua non*, most certainly in the earliest years of schooling and preferably throughout. At the moment such classes are found only in the schools specifically provided for the cerebral palsied.

Only when it is quite unavoidable because of the severity of disablement or because of geography, or some other good reason, should cerebral palsied children be segregated in schools for cerebral palsy cases only, but they should always be segregated in special classes or groups for basic subjects when attending a school for the physically handicapped or other special school, while being allowed to share with other non-brain-injured children in their group activities.

3. *From* G. A. POLLOCK, M.S.ORTH., F.R.C.S.E., J.A.L. NAUGHTON, M.B., B.SC. *and* T. T. S. INGRAM, M.R.C.P.E., *Edinburgh Clinic, Scottish Council for the Care of Spastics.*

In principle, we believe that the answer to this question is 'No'.

Education with other children, either normal or handicapped in another way, has all the social and educational advantages, especially for those who have prospects of living and working in the normal society.

We recommend education in classes or schools for cerebral palsies only when faced by a choice of evils. Not all local authorities provide a sufficient range of classes and training centres to cater for all types of educatable and trainable cerebral palsied children: some indeed provide nothing more than normal schools, and placing the child with cerebral palsy in a residential school catering only for cerebral palsy cases may then be the only means of providing adequate education and training. The family situation of other patients—e.g., death, physical or mental illness of the mother—may also make education in a special school for cerebral palsies necessary in the early school years.

Whenever possible, we feel that, even if a child requires education in a school for cerebral palsied children in his early school years, every effort should be made

to transfer him to a suitable mixed school later. This is especially important if normal employment is envisaged, for adjustment to normal society becomes progressively difficult the longer the child lives in a protected environment. Children with mild or moderate handicaps particularly seem liable to become egocentric, socially isolated, and to form unrealistically high opinions of their own abilities and attainments if left too long in schools catering only for cerebral palsied children.

LETTERS TO THE EDITOR

Mongolism and Fluorine in Drinking-water

SIR—In *Bulletin*, Vol. 1, No. 8, 1959, p. 43, you abstracted a paper by Rapaport (*Bull. Acad. nat. Med.*, 1959, **143**, 367–370) reporting a relationship, in Illinois, between the proportion of mongol births and the level of fluoride in various water-supplies. Rapaport (1956, *ibid.*, p. 529) earlier reported to the same effect, and because of this the Ministry of Health in England carried out a comparison of mongol births in cities and areas in Britain supplied by low (0.2 p.p.m. or less) and by high (0.7–2.0 p.p.m.) fluoride waters (Berry, W. T. C., *Amer. J. ment. Def.*, 1958, **62**, 634). No indication whatever was found of the relationship reported by Rapaport.

Because of the obvious bearing of Rapaport's findings, were they true, on the practice of artificially fluoridating water-supplies in order to reduce the incidence of dental caries, I examine, below, the possible reasons for this contradiction of findings.

One possible reason is of course the play of chance. Statistics, on which both sets of findings depend, can only indicate a degree of improbability, not impossibility. Nevertheless the odds against this as a cause of the contradiction are so high that we should for practical purposes reject it.

In the absence of evidence, we would be wise to reject, too, the possibility that some genetic difference between Englishmen and Americans leads to a different reaction to fluoride by the developing embryo.

This leaves for consideration (*a*) the possibility of some relevant environmental difference, and (*b*) that one or other study is faulty in design or execution. Of these, Rapaport favours the former. He points out that the consumption of tea in Great Britain is of the order of 10 lb. per head, compared with seven-tenths of a pound in U.S.A. An infusion of tea contains about 1 p.p.m. of fluoride when made with distilled water. All of Rapaport's reported data indicate a much lower incidence of mongolism in Illinois than in Great Britain, and Rapaport feels that 'Ces considérations nous paraissent rendre les statistiques récentes de Berry discutables'. Even if tea-drinking was responsible for a measure of mongolism in this country, one would expect that the additional load conferred by water containing fluoride would have an added effect. But Rapaport states that above 2 p.p.m. of fluoride, in Illinois, there is a 'plateau effect'.

If, however, the tea-drinking habits of the British were the reason for the differences between the two sets of findings there would be a similar difference between British data on mongolism and those of other workers in countries where tea is not the national drink. The following data are taken from *Recent Advances in Human Genetics* (ed. L. S. Penrose. London: Churchill, 1961).

No. mongols observed	*Incidence per* 1,000 *births*	*Population*	*Source*	*Date*
6	1.57	U.S.A.	Jenkins	1933
32	1.15	U.S.A.	Parker	1950
130	1.92	Switzerland	Hug.	1951
52	1.31	Denmark	Øster	1953

The equivalent data of Rapaport and of Berry are:

No. mongols observed	*Incidence per 1,000 births*	*Fluoride (p.p.m.)*	*Source*	*Date*
67	0.34	0–0.2	Rapaport (Illinois)	1959
33	0.47	0.3–0.7	Rapaport (Illinois)	1959
48	0.72	1.0–2.6	Rapaport (Illinois)	1959
64	1.42	0.7–2.0	Berry (U.K.)	1958
135	1.53	0.2 or less	Berry (U.K.)	1958

Obviously, the other American, Swiss, and Danish data do not support Rapaport's hypothesis. It follows that the other possibility must be considered—that the design of one or other study was unsound. My experience was that the greatest difficulty in the investigation was to ensure that we had, as far as practicable, traced *all* mongols. My data are validated by the fact that the incidence found is of the order reported by other workers in Britain. (For details the reader is referred to the original paper; but incidences reported or estimated elsewhere in Britain are 1.50, 1.29, 1.43, 1.61.) In contrast, the incidence reported by Rapaport is obviously lower than has been found by others in America or elsewhere.

Rapaport's earlier work (*loc. cit.*, 1956) contained certain flaws in design, some of which were pointed out to him by myself and others in correspondence. The present study includes one important difference from the usual practice followed by epidemiologists interested in the relation between vital statistics and the level of fluoride in water (including American workers). There is no indication in his paper of any attempt to compare high-fluoride areas with 'matched' low-fluoride areas. This is very important, in this country at least, because many waters high in fluoride are borehole supplies serving relatively small cities or towns, wherein the mongols may perhaps be more easily traced; and in fact Rapaport's findings, taken in conjunction with those I have quoted above, may well merely indicate that he failed to trace all mongols but traced them more successfully in areas served by water supplies which were high in fluoride. In my study careful consideration was given to the selection of 'control' towns which were both close to, and as far as possible comparable with, the towns where the fluoride content of the water was high.

I am sorry, Sir, to take up so much of your space, but it is clearly desirable that the slender basis of Rapaport's findings should be appreciated by his readers.—Yours, etc.

Ministry of Health, W. T. C. BERRY
Savile Row,
London, W.1.

Record-keeping—a Canadian Solution

Dr. Kenneth Holt's editorial on p. 107 has been shown to Prof. J. K. Martin and Dr. J. Preston Robb, who reply as follows:

SIR—I appreciate the opportunity to write in regard to Dr. Kenneth Holt's comments on the punch card used in Canada for children with cerebral palsy.

The shortcomings are acknowledged in the foreword of the manual accompanying these cards, where the hope is expressed that as experience is gained appropriate changes will be made. It should be emphasised that the main purpose of the Committee in drawing up a card was to endeavour to reach some uniformity of classification, so that larger numbers of cerebral palsy cases could be compared from one centre to another across Canada. The punch card was never intended to replace the detailed records which are kept

at each Cerebral Palsy Centre. No attempt was made to insist on uniformity in such records, except for classification purposes, though there is no doubt that, as a result of planning the punch card, various centres started to modify or increase the amount of information they kept on individual cases so that the records from different centres would be comparable. The back of the punch card was deliberately left blank, and this is used in many centres for recording the child's abilities and progress. Similarly, the associated defects can be specified more clearly on the appropriate line allowed in the centre of the face of the punch card. Details of the antenatal factors are contained in the case records.

So far, in most Cerebral Palsy Centres, numbers have not become a problem. It is true that in a province such as Manitoba there is only one cerebral palsy treatment centre, but even this centre, over a six-year period, saw less than 400 cases of cerebral palsy. In other provinces, and often in major cities, there are several cerebral palsy treatment centres. The card is used only for children—adults tend to be treated at different centres.

It might well be asked what value the card has been during the two years it has been in use. It certainly serves as a useful summary for the clinician in reviewing cases. Again, when a child is transferred from one centre to another it serves this function. Frequently detailed case-records are sent as well, and the new centre extracts what further details are required from the original case-record. It can be used as a quick screen for research projects, though as Dr. Holt points out the full case-records have to be used for more than superficial statistics. Its greatest value, however, has been, as was originally intended, in producing some uniformity in classification in different centres, so that larger numbers are available for analysis and comparison. As will be appreciated, this is no mean achievement when one considers the confusion that exists in terminology in cerebral palsy.

Department of Paediatrics, J. K. MARTIN
University Hospital,
Edmonton, Alberta,
Canada.

SIR—Dr. Kenneth Holt seems to have misinterpreted the use of the punch card presently being used in Canada, but in fact I would agree with his comments. The card is not a method of recording a case-history and does not replace the detailed case-history and long-term record that is necessary for the child with cerebral palsy. The card has provided a very useful means of finding certain types of disabilities and a means of follow-up. Its use in research is to enable one to find charts.—Yours, etc.

1610 Pine Avenue, West, J. PRESTON ROBB
Montreal 25,
Canada.

Genitalia Corpora

SIR—The review of your supplement on human chromosomes in the *Journal of Genetics* will not be printed for a month or so, so I am sending you a copy which you may quote if you wish to do so. As regards the heading of this letter, Lucretius asked how heredity could be possible if there were not '*genitalia corpora*', which may be rendered 'a physical basis of heredity'.—Yours, etc.

18/1 Barrackpore Trunk Road J. B. S. HALDANE
P.O. Belghoria (West Bengal),
India.

The review for the Journal of Genetics reads as follows:

A Proposed Standard of Nomenclature of Human Mitotic Chromosomes

(Supplement to *Cerebral Palsy Bulletin*, Vol. 2, No. 3, 1960.)

It is not often that one has to review an epoch-making document. This is one. Of the 14 authors, 6 are Americans and 2 a resident and an expatriated Asian. Catcheside, the chairman, Muller, and Stern acted as 'counsellors'; and Puck, of Denver, was host.

The 23 chromosome pairs of a normal woman fall fairly easily into 7 groups, on the basis of size and arm ratio. Within a group, and especially in the group of 8 of medium length with submedian centromeres, identification is harder, and there is disagreement as to the relative lengths. However, the authors have agreed to the assignment of numbers. And if chromosome No. 14 finally turns out to be shorter than No. 15, no great harm will be done. The agreement is a good augury for this rapidly expanding subject.

To the reviewer human karyology had seemed relatively sterile. With Lejeune, Turpin and Gautier's discovery of the aetiology of one type of mongolism it has become of very great importance. As so often happens, a French discovery opened up a new field of science, and workers in other countries soon expanded it greatly. We may hope that a combination of testicular biopsy and culture techniques may lead to a similar booklet on human meiotic chromosomes in the near future. In any case, the study of human translocation heterozygotes is of the utmost genetical interest.

If this reviewer may be permitted some 'back-seat driving', the following seem hopeful lines. The human Y chromosome is not genetically inert, but it seems to contain less functional loci than others. It is therefore the most likely to vary in size without serious genetic consequences. And it is the chromosome concerning which the six sets of authors cited in Table II show most disagreement. The lengths (in thousandths of the total of all chromosome lengths) vary from 11 to 22, a range of 11, to be compared with a range of 9 for the long chromosome, 3, and 7 for the short chromosome 21. And the three groups who reported a short arm of 17 to 26 per cent of its total length also found longer total lengths than those who found it completely acrocentric. This may reflect a real variation. But such a variation may be due to the presence of 'heterochromatin' which responds differently from that of other chromosomes both to mitosis and to pretreatment. No racial differences have yet been found, but I trust that they will continue to be looked for. A discovery that any group—for example, bushmen—differed from the rest of us would be of the widest interest; and a failure to find any such differences would underline the biological 'unity' of mankind. We know that translocations occur, and that some at least, though harmless to their possessors, are not harmless to their progeny. The most hopeful place to look for homozygous translocations is in small genetically isolated groups, such as the tribes of New Guinea. The authors point out that the satellites of chromosomes 13, 14 and 21 seem to be variable. This variation is doubtless being investigated.

The format is admirable. The text and the beautiful figures are on shiny paper, but this is interleaved with matt paper for notes. The *Cerebral Palsy Bulletin* is to be congratulated on this publication. Its scope is a little wider than its title suggests. It has included articles on 'Variations in perceptual ability', 'Phenylketonuria', and 'Effects of abnormal brain development on function', which should interest geneticists.

This little book is a classic, and no self-respecting library, even of an institution concerned

with plant or microbial genetics, should hesitate to buy it. Individual geneticists may well do so because it is the record of an outstanding achievement both in biological research and in international co-operation. Even a classical scholar might be prepared to spend five shillings or one dollar to commemorate the depiction, after just 2,000 years, of Lucretius' *genitalia corpora.*

J. B. S. Haldane

Dislocation of the Hip in Asymmetrical Spasticity of the Thigh Adductors

SIR—The problem of this type of dislocation, posed by Dr. Guy Tardieu in your last issue (p. 71), has not, I believe, been completely answered in the replies that followed. In my view, the primary factor causing paralytic dislocation of the hip is persistent valgus of the femoral neck, and I agree with Mr. Sharrard (p. 72) that adductor spasm alone will not cause dislocation. Valgus of the femoral neck persists because of the lack of moulding forces of muscular action and weight bearing. Pelvic obliquity and adductor spasm increase the 'effective valgus' and so hasten dislocation[1]. When subluxation begins to occur, reflex spasm accelerates the process so that actual dislocation may take place within a few weeks.

In my experience conservative treatment of subluxation or dislocation in cerebral palsy is ineffective and even harmful and I advise varus osteotomy of the femoral neck at an early stage. It is of great importance to recognise this stage and all physiotherapists should be aware of the reason for reduction in walking performance and increased spasticity. Some of the children complain of pain from the hip which makes recognition easier. In children who are only able to sit, the sitting balance may be destroyed by the increased spasm, and even in those who may never walk correction of the dislocation is well worth while for this reason. When the dislocation is recognised early it can usually be reduced easily by the simple process of abduction, with or without adductor tenotomy or obturator neurectomy, but it invariably recurs later unless varus osteotomy is performed. This osteotomy is done at the level of the upper edge of the lesser trochanter, taking out a wedge with the base inwards so as to produce an angle of 100–115° between the femoral neck and shaft. Since there will be some tendency for the correction to grow out in the younger child, the smaller angle is preferred for those in which the dislocation appears at an early age. Internal fixation is carried out with a miniature nail plate.

Immobilisation in plaster has particular problems for the cerebral palsy child: (i) a considerable reduction in voluntary power is always noted after immobilisation, particularly if for longer than 3 weeks; and (ii) alteration of reflex pattern can lead to insuperable problems in treatment if any extreme position is adopted, and this often applies to the normal extended abducted posture in hip-spica plasters. The duration of immobilisation in plaster should, therefore, be reduced to a minimum, and 2 months is adequate with the nail plate internal fixation.

It has lately become our practice to immobilise spastic children in a short double spica in the sitting position with the hips flexed 90°, abducted 15°, with the knees free. Sitting in a chair is encouraged the day after operation and exercises in the crawling position follow later. On removal of the plaster there has been little difficulty in regaining extension by physiotherapy, and the loss of voluntary power has been markedly less than in the children previously immobilised in the traditional extended position. Redislocation has not so far

[1] Somerville, E. W. 'Paralytic dislocation of the hip'. *J. Bone, Jt. Surg.* 1959, **41B**, 279-258.

occurred in any of the cases where the varus was obtained at an angle of less than 120°, providing there was a reasonable acetabulum. Early recognition of the pre-dislocation stage is therefore of considerable importance.

Restoration of muscle balance is difficult or even impossible to achieve in cerebral palsy, and the methods of tendon transplantation used in other forms of paralytic dislocation are unsuited to the spastic. Adductor tenotomy may be advisable in a number of the cases but can lead to less extensible, more severely contracted, muscles. Obturator neurectomy has similar objections but may occasionally be necessary where asymmetrical adductor spasm continues to be troublesome. However, after varus osteotomy, once the hip is comfortably re-aligned, reflex spasm is often so considerably reduced that the remaining problem is easily managed by physiotherapy.—Yours, etc.

Dame Hannah Rogers School for Cerebral Palsy, G. BLUNDELL JONES
Ivybridge, Devon.

BOOK REVIEWS

Resuscitation of the Newborn Infant

Edited by HAROLD ABRAMSON

Reviewed by R. J. K. BROWN, M.R.C.P., *Paediatrician to Queen Elizabeth's Hospital for Children, London.*

London: Henry Kimpton, 1960, pp. 275, 75*s*.

This book satisfies an obvious need. It provides a balanced and authoritative account of the general problem of perinatal mortality and morbidity and of the factors involved in foetal anoxia and neonatal asphyxia, in which the mechanics of resuscitation procedures are given their rightful place. Their importance is emphasised in the interests of those infants who require prompt help if they are to survive without any permanent neurological sequelae, but the need for them in any newborn infant is regretted as 'the culmination of an undesirable chain of preceding events and a breakdown of barriers to protect the developing foetus against the noxious agents which interfere with normal foetal oxygenation'.

All concerned with the care of the newborn will agree that this is the correct approach, and that our main duty is to spare the newborn infant the need for active resuscitation if we can. The authors rightly give top priority to the prevention of prematurity and of foetal distress. Inevitably, however, some babies will be born with little chance of survival without recourse to active measures of resuscitation. The chapters on this subject are well placed, the preceding chapters leading up to them in a logical sequence. They give a clear and concise account of methods which are easy to follow and should be equally easy to put into practice once the necessary skill has been acquired.

The authors favour artificial ventilation of the lungs in severely asphyxiated infants and they deny that endotracheal insufflation carries any danger provided it is performed skilfully and gently. They stress the fact that certain pulmonary lesions predispose to rupture of the lungs even from the infant's own respiratory efforts. They maintain that infants with such lesions are doomed; that positive pressures which are adequate and safe for normal lungs will therefore damage an occasional lung; and that, if the predisposing conditions are found at autopsy, the accident of lung rupture should not be attributed to the method of resuscitation or the operator. The final conclusion may be true but it cannot be inferred from the premises given, and some readers may therefore think such dogmatism unjustified.

The proponents of a more conservative approach to resuscitation base their views on the observation that many severely depressed infants start breathing spontaneously if given time. It is not yet certain how long one can *safely* wait in such cases. Further studies are needed to correlate clinical signs with biochemical evidence of asphyxia, together with long-term follow-up of survivors. Many such avenues of research are discussed in the later chapters, and these should provide a great stimulus to all readers who are interested in this subject.

Those already acquainted with the

Report on Resuscitation of Newborn Infants by the Special Committee on Infant Mortality will be anxious to read Dr. Abramson's larger and more comprehensive work, and they will not be disappointed. Indeed, the names of the members of his team are sufficient guarantee of the excellent fare to follow.

This is a new book, so there are some parts which will require revision in later editions, especially the statement that the association of iso-immunisation with prematurity carries almost 100 per cent mortality. Nevertheless, it is an excellent book, well planned and well written, and the publishers are to be congratulated on the production, particularly on the quality of the illustrations.

R. J. K. BROWN

Clinical Child Psychiatry

By KENNETH SODDY

London: Baillière, Tindall & Cox, 1960, pp. 462, 42*s*.

In the clinical field of the psychiatric disorders of childhood two traditions are apparent. One, the Child Guidance approach, concentrates on the child, accepts referrals through diagnostic measures at school, encourages a team-patient relationship, works largely in an educational setting, and depends on measures to advise, reassure and guide the parent. The second, Child Psychiatry, indivisible from adult neurosis practice, concentrates equally on child and parent, encourages a direct approach to the home through the general practitioner, adopts systematic clinical methods, flourishes in the hospital setting, and applies measures for treating both parent and child. This book, intended for those working in child guidance and allied fields, is written in the tradition of Child Guidance.

The book is conveniently divisible into three sections. The first introductory section, of 45 pages, considers constitutional and environmental factors. Some readers will be disappointed at its incompleteness—e.g., that little mention is made of ethnological and ethological studies; in the absence of data it is difficult to give the same central place in aetiology to the 'hereditary tendency' to relationship formation as the author does; many will find the classification of child and adult personality in terms of 'outgoing and ingoing' to be superficial and outdated.

The third section of 60 pages, like the first, can satisfy only the general reader. Classification, investigation and treatment are dealt with here. The serious student will, again, react adversely to its incompleteness—e.g., no methods of examination are given in a book aspiring to be a textbook of child psychiatry. The author employs a descriptive classification of syndromes occurring at age levels of development. Psychiatry has still to find a satisfactory classification of disease entities. Many will regard the systems of investigation and treatment as outmoded—e.g., the psychiatrist's contact with the parent is largely 'secondhand'; that parents may need treatment is said to be 'occasionally true' and it is suggested that they should seek therapy 'elsewhere'.

The middle and major section, about 350 pages, takes each stage of development from gestation to adolescence and reviews the developmental features and disease processes of each stage. The author, with 20 years amalgam of experience in child guidance practice in London, at the Child Guidance Training Centre and University College Hospital, is an acknowledged expert in child development, which is reflected in this section. A hundred

selected case-histories are included to exemplify the syndromes described. This section would have stood better on its own. It will be regarded as a valuable source of reference on emotional development by even the most experienced paediatrician and child psychiatrist. The title of the book should be adjusted to point to where the gold lies.

J. G. HOWELLS

Lectures on the Scientific Basis of Medicine. Vol. 7, 1957/58

By VARIOUS AUTHORS

London: University of London, Athlone Press, 1959, pp. 496, 45*s*.

This is the seventh volume of lectures in the distinguished series arranged by the British Postgraduate Medical Federation, and one can hardly praise it more than by saying that it well maintains the standard of the previous six. Each lecture is by an expert who surveys part of his own territory and reports on its fruits, some of them raised by others and some the result of cultivation of his own garden. None is of immediate practical application in the field of cerebral palsy, but several are relevant to its problems—for example, the genetic studies of Lionel Penrose and of Fraser Roberts.

P. L. Krohn's lecture on *Ageing Processes in the Female Reproductive Tract* is particularly interesting; that 'the ovary, indeed, seems to represent the Achilles heel of the endocrine system' is an arresting thought to anyone who has wondered about the fate of infants of mothers with thyroid disease, or the high incidence of twinning in cerebral palsy. *The Influence of Oxygen on the Response of Cells and Tissues to Ionizing Radiation*, by L. H. Gray, enlarges the imagination by its classification of the sensitivity of cells and tissues in relation to oxygen tension, while Kenneth Cross unlocks a door and allows us a peep at the reactions of the newborn to lack of oxygen. In the peripheral field, C. S. Hallpike's *Some Remarks on the Scientific Basis of Otological Practice* are clear and brilliant but, as we should have known from the title, more related to the ear than to the understanding of sound. G. Gordon's and J. A. B. Gray's lectures on sensation may profitably be read by those investigating the extramotor problems of cerebral palsy, although any practical use of their findings will at present be found only in careful study of intelligent adult 'spastics'.

This is a book for the student of cerebral palsy to take on a long railway journey when he is too tired to think out his own problems or to relax. He will open it at random, idly interpret a diagram, flip over a page and find an arresting paragraph. Then 'The angels keep their ancient places; Turn but a stone, and start a wing!' Aflight, the scientific imagination soars in its natural aether.

PHILIP EVANS

Anatomy and Physiology of Speech

By HAROLD M. KAPLAN

London: McGraw-Hill, 1960, pp. 365, 66*s*.

This book is intended as a text for American students of speech pathology. The claim on the dust jacket, that 'No other available text presents the broad coverage of the anatomy and physiology of the vocal mechanism', is probably justified. However, the keen student who fears he is missing out something will find a 'far from complete' list of 14 journals to be consulted in Chapter 8. Since these

include *Folia Phoniatrica*, the *Journal of Laryngology and Otology*, the *Journal of Neurophysiology*, and the *Transactions of the American Academy of Ophthalmology and Otolaryngology*, he is unlikely to remain disappointed after reading them.

The accounts of anatomical and physiological processes not directly concerned with speech, mostly discussed in the first three chapters, can only be described as sketchy. The accounts of current concepts of cerebral palsy and the aetiology of stuttering in the chapter on the '*Nervous Regulation of Speech*' seem inadequate, out of context and misleading. If these subjects had to be mentioned they should have been much more fully discussed.

In contrast, the detailed descriptions of the anatomy and function of the larynx and articulatory organs in later chapters are full of information and useful supplementary references. They provide a more than adequate account of what is known about speech mechanisms, though the text might have been easier to follow if the illustrations had been larger and more closely related to the written descriptions.

The book is well printed and produced. The glossary, bibliography and index are all adequate and extremely welcome in a book which fills a definite need. It will be particularly useful to doctors who lecture to student speech therapists on anatomy and physiology, though many of them will find it difficult to digest fully.

T. T. S. INGRAM

Discussions on Child Development

Edited by J. M. TANNER AND BARBEL INHELDER.
London: Tavistock Publications, 1960, pp. 186, 30*s*.

This is the edited report of the fourth and last meeting of a research study group which met in 1956 under the auspices of the World Health Organisation to discuss various aspects of the biological, psychological and cultural factors in child development.

In keeping with the best of symposia, it avoids the practice of presenting a number of formal prepared papers, with the inevitable divisions between specialities; instead, the editors have allowed us to take part in an exchange of ideas and opinions between international experts from many scientific disciplines (ethology, anthropology, psychology, psychiatry and psychoanalysis, electrophysiology, and human and general biology).

Unlike the preceding volumes, this one is divided into two sections. The first consists mainly of an essay by Prof. Jean Piaget, intended to be a summary of the views expressed by members of the group at previous meetings. It also gives him an opportunity to elaborate in some detail his own concepts of the role of cognitive processes in the maturation of personality, and, perhaps more important, serves to stimulate among members of the group a wide-ranging discussion which is carried over into the second half of the book.

A reader without any specialised knowledge of childhood development cannot fail to be impressed by the eagerness and frankness of the contributors, and especially the way in which they can be seen to influence and educate each other at a truly professorial level. It is particularly refreshing, for example, to learn from Dr. Konrad Lorenz that Professor von Bertalanffy's General Systems theory was previously quite unknown to him, and to discover that Dr. John Bowlby is puzzled by some of Professor Piaget's remarks. Nevertheless, it is also clear that a proper appreciation of this book requires a basic knowledge of psychobiological studies and familiarity with a rather specialised terminology. Further, since this is the final publication in an important series it should be read in conjunction with the preceding three volumes. Indeed there are many

references and an occasional abbreviation which make it almost essential to look at the earlier texts.

This is not intended in any sense as adverse criticism, for one must remember that in arranging the conferences the World Health Organisation had in view the need for informal discussions between workers in different fields as a way of furthering new prospects for research; publication of the proceedings was not originally intended. Our thanks are therefore due to the editors who have preserved the informal atmosphere of the meetings in such a readable fashion; and all the members of the study group deserve to be congratulated for their contribution to a publication which, in the editors' own words, has 'given us a glimpse of what might become a general pattern for maintaining those precious and precarious possessions, wide horizons and flexible minds'.

F. W. NASH

The Mentally Subnormal: the Social Case-work Approach

Edited by MARGARET ADAMS
London: Heinemann, 1960, pp. 271, 25*s*.

This collection of contributions by specialists in the various aspects of mental disorder is very welcome at a time when the new Mental Health Act has brought a fresh approach to the problem and placed the responsibility for the care of the subnormal on the community at large.

Against a helpful and necessary historical background, the clinical picture is discussed and the social problems and difficulties of adjustment considered. The need for early diagnosis is stressed, this to be followed by regular and frequent assessment which must include the family and social environment. Relatives often need case-work help in accepting diagnosis and in coming to terms with their own feelings. Here the social worker should ideally make her contact with the family, because often there can be no real progress with future planning until these adjustments are made.

The following chapters enlarge these observations and consider the role and aim of the social worker both in the community and in the hospital setting, and also review and discuss the facilities available. The use of case-work skill can help the subnormal child or adult to live a full and useful life and can stimulate and encourage their development, thus making it easier for them to live within the community and to profit from training and rehabilitation. Hospital care for the severely subnormal is shown as a means towards rehabilitation rather than as a permanent solution. Given the necessary support and encouragement, limited success can be achieved among this group provided the social background is good. Emphasis is laid on the necessity to help the family and other people with whom there is frequent contact, and to understand and accept the subnormal person; the social worker's contribution to this end is shown. Short case-histories are used throughout to illustrate and support the discussion and to help show that subnormal people can and do profit by case-work help.

The new trend towards community care for the subnormal must throw a heavy responsibility on the doctors and social workers concerned, and many more of both will be needed. One sees a tendency to move away from thinking in terms of particular disabilities and more towards seeing the disabled person as an individual and a member of a family within the community. This focus could stimulate a redeployment in the use of social workers and would be a welcome move. The implementation of the Younghusband

Report could be a first step towards this and towards meeting the shortage of trained social workers.

This book should be widely read. It will interest and encourage possible future workers, at the same time helping to make the problems of the subnormal person and his family better understood and accepted within the community.

D. E. M. HUNTER

Antisera, Toxoids, Vaccines and Tuberculins in Prophylaxis and Treatment

By H. J. PARISH AND D. A. CANNON

Edinburgh and London: Livingstone, 1961, 5th ed., pp. 288, 37*s.* 6*d.*

This fifth edition of Parish's textbook (now Parish and Cannon) is a well-produced volume which maintains the high standard of its predecessors. The writing is lucid and the explanations clear. It is full of valuable information, well set out and covering a wide field. The coloured plates of the Schick reactions and smallpox and B.C.G. vaccinations are excellent, as are the photographs of outstanding characters in the history of immunisation —a fitting accompaniment to the brief historical outline of the subject with which the book concludes. There are, on the other hand, no fewer than 11 photographs of various phases of the work in production plants which really only detract from the value of the work as a whole and would be better omitted.

It is impossible for a book to be completely up-to-date in the matter of immunological developments, so swift are the advances in this dynamic subject, but it may fairly be said that this book is as up-to-date as possible.

WILFRID GAISFORD

Current Medical Research

Articles in the Report of the Medical Research Council for 1958/59

London: H.M. Stationery Office, 1960, pp. 56, 3*s.* 6*d.*

This report includes 12 articles considered to be of interest to the medical, scientific and lay public. There are three articles on viruses—on their structure, the arthropod-borne variety and interferon as an anti-viral agent—and two on human genetics and chromosome abnormalities. The report contains further information on the relationship of occupation to coronary heart disease and also some applications of electron microscopy, which has helped to reveal the structure of muscles in relation to the mechanism of contraction, which is the subject of another article.

There is considerable variety, from clean air in operating theatres to the plasma kinins, some relevant factors in the problem of inattention which results in industrial injury, and the chemotherapy of tuberculosis in East Africa and India. Some of the articles are of immediate practical importance while others indicate the future trend of medical practice.

O. D. FISHER

Disease in Infancy and Childhood

By PROF. RICHARD W. B. ELLIS

Edinburgh and London: Livingstone, 1960, 3rd. ed., pp. 722, 55*s.*

This book is written primarily for medical students seeking an introduction to paediatrics and practitioners wanting to revise the subject. It is not intended as a comprehensive textbook, but each chapter ends with an excellent list of references

enabling the reader to extend his knowledge of paediatrics. The author, in the early chapters, correlates the natural history of disease with the development of the child, as might be expected of a professor of child life and health. In the later chapters, the customary systematic approach is used and the student will find the relevant problems dealt with in a thoroughly practical manner by a most experienced clinician. The longest chapter, on *Congenital Malformations*, is particularly valuable, revealing the author's own extensive knowledge and interest.

This third edition is more balanced than the previous two and has been carefully revised to include recent and important advances made in virology and paediatric surgery and by chromosome studies, while the book remains the same size, with over 300 illustrations which really shed light on the text. The metric system is used consistently where drug therapy is concerned, there is a fully adequate index, and the text shows few typographical errors.

Any criticism is of a minor nature—for example, the dosages advised for chloramphenicol in severe infections such as influenzal meningitis, and for streptomycin and isoniazid as anti-tuberculous drugs, are perhaps unduly cautious. Piperazine for roundworm infestation, and sodium calcium edetate for lead poisoning are both well established and successful methods of treatment but are not included. In the differential diagnosis of jaundice in the neo-natal period, infective (viral) hepatitis is not included, though this is probably commoner than that due to either congenital syphilis or familial acholuric jaundice at this age. In discussing haemolytic disease of the newborn, a serum bilirubin level of more than 7 mg. per 100 ml. is given as an indication for exchange transfusion, while a level of 2.7–3 mg. per 100 ml. is generally accepted. I was surprised to find Professor Ellis recommending calomel in the treatment of infective hepatitis, since this drug contains mercury which has been incriminated as a causative factor in pink disease and lower nephron necrosis. Since there are suitable alternatives, calomel should no longer be used in paediatric practice.

Nevertheless, this book, crammed with useful information and wise advice, clearly written and easily read, is highly recommended and should prove a most successful edition.

O. D. FISHER

Equipment for the Disabled

An Index in Four Volumes

London: The National Fund for Research into Poliomyelitis and Other Crippling Diseases, 1960, £6.

This is the first really comprehensive British loose-leaf index of equipment for the disabled, although the concept is by no means new. The compilers and publishers are to be congratulated on the high standard of their work, which will be of considerable value to those directly concerned with the provision of equipment for a broad range of disabilities. Some 526 well printed and illustrated sheets are grouped under main and sub-headings and contained in four stout but rather cumbersome binders; as with its American counterparts, one feels that the number and size of the sheets could have been reduced to make the whole index handier and less costly.

The presentation of commercial items is mainly a question of patient collection, selection and grouping from trade informa-

tion that is readily available. What is more difficult is the presentation of non-commercial and often home-made equipment which must first be translated into clear working drawings and followed by adequate material specifications and constructional details suitable for the amateur as well as the tradesman. Here, unfortunately, the index does not compare well with its American predecessors.

The almost complete absence of special equipment and aids for the cerebral palsied child or adult is perhaps connected with this general lack of non-commercial items, particularly in regard to special furniture and teaching aids. This is a serious omission and one which is difficult to understand when there are two national cerebral palsy organisations competent to provide the information.

It would be unrealistic to expect any index of equipment and aids to cover every item. The important thing is that, in addition to being as comprehensive as its size will permit, it should stimulate the adaptation of general principles to individual cases.

The use of a loose-leaf system of indexing gives greater flexibility as well as allowing for additions and withdrawals and amendments, but if one uses the form asking for additional sheets as they are published one wonders how long the process of expansion will be maintained. Of even greater value would be single sheets available for individual enquirers. This need is naturally greatest in connection with the non-commercial items of equipment or statutory provisions.

Perhaps the poorest section in this large index is the first, which deals with House Adaptations. When a local housing society goes to the expense of building a special bungalow for two short sisters (Sheet 1.A.5), and takes such trouble to reduce the height of all fixtures, it seems a pity that the occupants cannot look out of the kitchen window like normal people. More care should perhaps have been taken to ensure that suggestions and ideas from abroad are permissible over here. Most water-supply undertakings will not allow lever taps (Sheet 1.C.4) to be used if they are connected directly to the mains—as for drinking-water—though they may be used from a header tank supply, as in hot water circuits.

Despite these minor shortcomings the index makes a valuable contribution to the collation of information in this general field.

J. H. BOYDELL

Abstracts

In collaboration with *Abstracts of World Medicine*, published by the British Medical Association, and with the kind assistance of the Excerpta Medica Foundation, *Courrier*, and *Obstetrical and Gynecological Survey*.

A Mongol Girl with 46 Chromosomes
P. E. POLANI, J. H. BRIGGS, C. E. FORD, C. M. CLARKE and J. M. BERG. *Lancet*, April 2, 1960, **i**, 721–724.

A mongol girl, selected because she was born from a young mother, in contrast with reported chromosome findings in mongols, had only 46 chromosomes in her bone-marrow cells and had 4 small acrocentric chromosomes like normal females. There were only 5, instead of 6, of the longer acrocentric chromosomes (pairs 14, 15, or 16) but an extra chromosome was present that was not certainly distinguishable from chromosome 12; and this may have carried the major part of the genetic material of chromosome 22.

A reciprocal translocation between chromosomes ?15 and 22 is suggested as the origin of the anomaly. The possibility that it originated during the development of the patient herself is unlikely but not excluded. It is more likely to have occurred in one of the parents, or even a grandparent, possibly during development. If one parent was affected, he or she would be a gonosomic mosaic, and there would be an increased probability of further mongol births, as well as other familial and genetic implications. If one of the grandparents was affected the genetic implications would be the same, but one of the parents would be distinct in his or her somatic (and germinal) chromosomal make-up.—*Authors' summary.*

Note: The chromosome nomenclature used in this paper was that which had been used in Dr. Ford's laboratory. At present the new Denver Convention nomenclature is used (see supplement to this *Bulletin*, Vol. 2, No. 3, 1960), according to which Ford's Nos. 14, 15 and 16 become 13, 14 and 15; 12 remains unchanged; while Ford's No. 21 corresponds to No. 21 in the Denver nomenclature. The possibility of chromosome 'translocation' being the mechanism of familial mongolism, raised in this paper, has later been proved correct by the findings of L. S. Penrose, J. R. Ellis and D. A. Joy ('Chromosomal Translocation in Mongolism and in Normal Relatives', *Lancet*, 1960, **ii**, 409) and of C. O. Carter, J. L. Hamerton, P. E. Polani, A. Gunalp and S. D. V. Weller ('Chromosomal Translocation as a Cause of Familial Mongolism', *Ibid*, p. 678).—*Paul E. Polani.*

The Origin of Pulmonary Hyaline Membrane Disease in Premature Infants Delivered by Cesarean Section before Labor
F. F. SNYDER. *Obstetrics and Gynecology*, Dec., 1959, **14**, 730–742.

This paper from Harvard University and the Boston Lying-in Hospital reports a study of hyaline membrane disease in a group of premature infants delivered by caesarean section before the onset of labour and rupture of the membranes. The paper is complementary to a similar study (*Obstet. and Gynec.*, 1959, **14**, 267; *Abstr. Wld Med.*, 1960, **27**, 242) of a group of mature infants who died following elective caesarean section. The author's observations are based on the clinical and necropsy records of 22 live-born infants weighing 1,660–2,450 g. who survived 6–72 hours after delivery.

In all instances histological examination showed blood, epithelial cells, amorphous

debris, and hyaline membrane in the air passages, these findings being extensive and severe in half the cases. The author considers this material to be entirely derived from amniotic fluid, contaminated by blood on incision of the uterus, and aspirated into the lungs, principally during the brief interval before the extraction of the foetus. The associated atelectasis he interprets as due to the mechanical effect of blockage of the air passages by the aspirated debris.

In view of the similar histological findings in this group and in the earlier group of mature infants he considers that, although prematurity in itself does not influence the aspiration of contaminated amniotic fluid, the hazards of aspiration are greater in the premature than in the mature infant. He also suggests that in elective caesarean section greater reflex respiratory activity of the foetus may render it more likely to aspirate significant amounts of amniotic fluid.

[The author's basic premise is that the amorphous material in the alveoli is derived from amniotic fluid, but he does not, in this paper, produce any objective evidence to support this.] *E. G. Hall*

The Interaction of Plasma Proteins and Mucoid Substances in the Pathogenesis of Pulmonary Hyaline Membranes

F. A. CARONE and W. G. SPECTOR. *Journal of Pathology and Bacteriology*, 1960, **80**, 63–71. 6 figs., 27 refs.

The various theories of the mechanism of hyaline membrane formation are stated, and experiments done at University College Hospital Medical School, London, on rats to see whether the interaction of various acidic polysaccharides and plasma protein in the pulmonary air spaces would give rise to structures looking and staining like hyaline membranes are described. In a first series of experiments pulmonary oedema was produced by the intraperitoneal injection of α-naphthyl thiourea and the introduction of dextran sulphate, mucus, or meconium into the trachea up to one hour later, resulting in most cases in the development of structures resembling typical hyaline membranes. The endotracheal introduction of amniotic fluid had the same effect only if the fluid had previously been concentrated. In the absence of pulmonary oedema these substances had no such effect. In a further group of animals the endotracheal injection of dextran sulphate, nasal, tracheal, or bronchial mucus, or meconium together with rat plasma gave rise to similar membranes.

It is suggested that in the human foetus or newborn infant mucus from the bronchi or stomach, meconium, or amniotic fluid inhaled into the lung may form hyaline membranes by interaction with protein if pulmonary oedema is present. This theory is very fully discussed in the light of a comparison of the experimental and natural hyaline membranes. It is concluded that fibrinogen is the important constituent of oedema fluid which reacts with acidic mucopolysaccharides to form these membranes. *G. J. Cunningham*

Pediatric Management of School Learning Problems of Underachievement

A. J. SOLNIT and M. H. STARK. *New England Journal of Medicine*, Nov. 12, 1959, **261**, 988–993.

The authors of this paper from Yale University School of Medicine point out that learning difficulties are often closely connected with physical and psychological disturbances in the developing child. The main factors which prevent a normally intelligent child from learning are defective hearing, insufficient auditory-motor coordination, anxiety, and parental mismanagement. The authors mention 4 cases in which school learning problems were associated with physical, intellectual, environmental, and emotional factors. They are of the opinion that a paediatrician's advice may be preferred to

psychiatric treatment, as he knows the child's physical and intellectual development as well as the parents' attitude and behaviour. It is, however, questionable how far the paediatrician is fitted by his training to give advice on remedial educational work.

[The opinions and approach of these authors are psychologically sound and represent orthodox views on these problems; it is, therefore, a question of how far they are duplicating already existing school psychological services.] *Franz Heimann*

Reading, Reckoning, and Special Schooling among the Mentally Handicapped

Z. STEIN, M. SUSSER and E. A. LUNZER. *Lancet*, Aug. 6, 1960, **ii**, 305–307.

There has been a dearth of follow-up information about the benefit which the mentally handicapped child derives from special school education. This paper from the Departments of Education and of Social Medicine, Manchester University, analyses the end-result of different educational programmes in 49 educationally subnormal men and women, aged 20 to 24 years, who were divided into two groups according to whether they had attended ordinary or special schools. Of 31 who had attended ordinary schools 10 were illiterate, but of the 18 who had been to special schools only one was illiterate, this difference being statistically significant at the 5 per cent level; 'illiteracy' was defined as a reading age of under 7 years on the Schonell reading test. The mean I.Q. (on the Stanford-Binet scale) was 66 (S.D. 9) for the special-school group and 70 (S.D. 10) for the ordinary-school series. Of 14 with an I.Q. of under 70 who had attended ordinary school 8 were illiterate, but all of 10 with a similar I.Q. who had been to a special school could read, although half were 'semi-illiterate' (reading age 7 to 9 years). Of the 17 ordinary-school pupils with an I.Q. of 70 or over, 2 were illiterate, and of 8 similar special-school pupils one was illiterate. The presence of clinical abnormality in 20 individuals (13 with neurological signs, 4 imbeciles, and 3 with severe hearing defects) did not influence the effects of special schooling, only one out of 9 such subjects remaining illiterate, compared with 4 out of 11 who attended ordinary schools. As the patients were tested several years after leaving school and some had learned to read after schooling had stopped, the suggestion is made that reading lessons for older patients in occupation centres and mental deficiency hospitals may be worth while. In regard to 'reckoning', ordinary-school education had left 7 subjects 'innumerate', whereas 4 who had attended special schools remained innumerate (score less than 4 on the Wechsler adult intelligence scale, arithmetic sub-test). Of 23 with an I.Q. over 65 (Stanford–Binet) who had attended ordinary schools 5 were innumerate, but none of 10 taught at special schools scored less than 4.

It is pointed out that the subjects of this study had been to different special schools and had thus been taught by different teachers and methods, but nevertheless a common factor was the small number of children in each class which permitted much more concentration on the individual child. No evidence was obtained to show whether the greater improvement taking place in the special-school pupil was due to segregation or to teaching methods, but it was shown that such improvement was not related to clinical condition or family background.

[Reading classes have been held in mental deficiency hospitals for many years (see Rudolf, *Brentry Colony Reports*, 1933).] *G. de M. Rudolf*

Note: In any form of mental handicap, achieving success in something is a great aid to further betterment. In the mentally normal, reading gives satisfaction apart

from its Baconian function of increasing learning. Any special educational arrangements which offer scope for reading to mentally subnormal children or adults must form a part of improving the present-day schemes. Quiet gentle encouragement and acceptance of the slow pace and progress are part of the process. By close study of the tempo of learning in the mentally subnormal, and an individualisation of approach, as far as time allows, more profitable gains will be recorded.

This report is extremely interesting and important, and Dr. Rudolf's note is reassuring.—*A. V. Neale.*

The Etiology of Athetosis with Particular Reference to Neonatal Jaundice

DAVID BURMAN and K. S. HOLT. *Journal of the Iowa State Medical Society*, May 1960, pp. 256–259.

In a retrospective survey of 54 children with athetosis, anoxia was present at birth in 28 cases and 25 of the children had suffered from severe neonatal jaundice. These two factors accounted for 49 of the 54 cases. There were 14 premature babies but jaundice or anoxia complicated the prematurity in all but two cases. It is concluded that in many of these cases the athetosis might have been prevented.

T. E. Oppé

Studies in Febrile Seizures. V. Clinical and Electroencephalographic Study in Unselected Patients

J. G. MILLICHAP, J. A. MADSEN and L. M. ALEDORT. *Neurology*, July, 1960, **10**, 643–653.

The purpose of this study was to determine the important factors in the aetiology and mechanism of febrile seizures on the basis of the clinical and electroencephalographic findings in 110 unselected children examined at the Bronx Municipal Hospital Center, New York. Febrile seizures were approximately twice as common in boys as in girls but no racial propensity was apparent. The first attack occurred most commonly between 6 months and 3 years of age. At the completion of the study attacks had recurred in 58 of the patients, but only 13 had had more than 4 attacks. The most frequent predisposing illnesses were acute throat infections (in 54 per cent), otitis media (in 17 per cent), and specific infections (in 13 per cent). The mean temperature at the onset of the seizure was 104° F. (40° C.). The convulsions were of the tonic-clonic type in 85 per cent and focal in 15 per cent; they lasted less than 5 minutes in 43 per cent, 5 to 10 minutes in 22 per cent, 10 to 20 minutes in 19 per cent, and longer than 20 minutes in 16 per cent. Non-febrile convulsions were associated in 31 (29 per cent) of the cases. Additional features were disordered behaviour in 35 per cent of the patients, recurrent abdominal pain in 21 per cent, and allergic conditions in 20 per cent. There was a family history of fits in 30 per cent of cases.

The EEG, which was obtained in 76 of the 110 cases, was normal in 52; in 18 seizure discharges were observed and in 6 'borderline' abnormalities. *John Fry*

Note: It is an unfortunate act of Nature that infants and young children are so vulnerable to convulsions at the onset of an acute fever, especially with throat infections. To parents such an episode is highly alarming. To the doctor there is a sense of urgency in controlling the convulsions, since he recognises the danger of damage to the brain during or immediately after the event. An infant or child who has a latent inborn susceptibility to cerebral dysrhythmia, or who has already had a non-febrile convulsion, runs an increased risk at the onset of any acute pyrexia. Prophylaxis may therefore be desirable in these circumstances. Too much reliance need not be placed on electroencephalography in these young infants, and it

should be remembered that an injudicious use of the word 'epilepsy' may well have the effect of creating fear iatrogenically.—*A. V. Neale.*

Treatment of 'Hypsarrhythmia' with ACTH. (*In English*)
W. TROJABORG and P. PLUM. *Acta paediatrica* (*Uppsala*), Sept., 1960, **49**, 572–582. 8 figs., 17 refs.

The term 'hypsarrhythmia' has been applied to the type of infantile spasm which is associated with a characteristic EEG. The prognosis is extremely poor; 10 per cent of affected children die in the first year of life and 90 per cent become mentally defective. The spasms consist of a series of jerks which vary in number from 2 or 3 to 70, and as many as 10 attacks can occur in one day. The attacks usually start between the age of one month and 13 months and cease spontaneously at 3–4 years of age. At the Rigshospital, Copenhagen, the authors studied the response to ACTH of 30 children (22 boys and 8 girls under 18 months of age) suffering from hypsarrhythmia; 7 died before the age of 3 years and of the remaining 23, 19 are mentally defective and the other 4 suspected of being so. Cerebral palsy was present in 13, and in the 25 in whom air encephalography was performed there was evidence of cortical and ventricular atrophy. The EEG showed large slow waves and asynchronous spikes. At necropsy on 4 patients diffuse extensive cortical and subcortical degenerative and destructive processes were found.

Treatment was with 5–10 units of ACTH daily for 3 to 4 weeks. Of the 22 patients so treated, 7 showed definite clinical benefit with a reduction in or cessation of attacks and, in 4, a normal EEG. This was associated with some improvement in intelligence, which, however, never became normal. In 3 patients there was an effect on the EEG only, while in 12 no clinical or EEG improvement was observed. The authors emphasise that a beneficial effect can be expected only if treatment is started early.

N. S. Alcock

Note: It is now fairly clear that 'hypsarrhythmia' is a deep-seated and usually an intractable condition. This pessimistic view is supported by the anatomical brain atrophy found in a high proportion of cases. The pathology is likely to be extremely subtle, but it might be worth bearing in mind that immunosensitisation processes may play a part. Some screening in this way may help in tracking down the causes of a by no means rare brain disease of early life.—*A. V. Neale.*

The Enzymatic Expression of Heterozygosity in Families of Children with Galactosemia
G. N. DONNELL, W. R. BERGREN, R. K. BRETTHAUER and R. G. HANSEN. *Pediatrics*, April 1960, **25**, 572–581.

Assay of galactose-1-phosphate uridyl transferase in erythrocytes has been applied to a study of 14 families in which a known case of galactosaemia has occurred. Including normal controls, 278 individuals were involved. The method employed was sensitive enough to differentiate between homozygous, heterozygous and normal individuals. The results substantiate the conclusion that galactosaemia is a genetic disease transmitted by simple autosomal Mendelian inheritance.

Authors' Summary